

University of Nebraska - Lincoln

DigitalCommons@University of Nebraska - Lincoln

Papers in Ornithology

Papers in the Biological Sciences

12-9-2008

Louis A. Fuertes and the Zoological Art of the 1926–1927 Abyssinian Expedition of The Field Museum of Natural History

Paul A. Johnsgard

University of Nebraska - Lincoln, pajohnsgard@gmail.com

Follow this and additional works at: <https://digitalcommons.unl.edu/biosciornithology>

 Part of the Art Practice Commons, Ornithology Commons, and the Zoology Commons

Johnsgard, Paul A., "Louis A. Fuertes and the Zoological Art of the 1926–1927 Abyssinian Expedition of The Field Museum of Natural History" (2008). *Papers in Ornithology*. 44.
<https://digitalcommons.unl.edu/biosciornithology/44>

This Article is brought to you for free and open access by the Papers in the Biological Sciences at DigitalCommons@University of Nebraska - Lincoln. It has been accepted for inclusion in Papers in Ornithology by an authorized administrator of DigitalCommons@University of Nebraska - Lincoln.

12-9-2008

Louis A. Fuertes and the Zoological Art of the 1926–1927 Abyssinian Expedition of The Field Museum of Natural History

Paul A. Johnsgard

University of Nebraska - Lincoln, pajohnsgard@gmail.com

Follow this and additional works at: <http://digitalcommons.unl.edu/biosciornithology>



Part of the [Art Practice Commons](#), [Ornithology Commons](#), and the [Zoology Commons](#)

Johnsgard, Paul A., "Louis A. Fuertes and the Zoological Art of the 1926–1927 Abyssinian Expedition of The Field Museum of Natural History" (2008). *Papers in Ornithology*. 44.

<http://digitalcommons.unl.edu/biosciornithology/44>

This Article is brought to you for free and open access by the Papers in the Biological Sciences at DigitalCommons@University of Nebraska - Lincoln. It has been accepted for inclusion in Papers in Ornithology by an authorized administrator of DigitalCommons@University of Nebraska - Lincoln.

Louis A. Fuertes and the Zoological Art of the 1926–1927 Abyssinian Expedition of The Field Museum of Natural History

Paul A. Johnsgard

School of Biological Sciences
University of Nebraska–Lincoln, Lincoln, NE



Dashed line shows approximate route of Fuertes while in Abyssinia (Ethiopia)

Copyright © Paul A. Johnsgard, 2008.

Preface

The year 2009 marked the 110th. anniversary of the first colored reproduction of a Fuertes painting; a watercolor of two seaside sparrows published in *The Auk*, when Fuertes was about 25 years old. Although Fuertes' life spanned little more than a half-century, and most living ornithologists were born after his tragic 1927 death, his influence on natural history art has not lessened. This manuscript is a testimony to his enduring artistic legacy.

I first looked in awe at the original set of Fuertes paintings in the summer of 1995, during a visit to the Field Museum in conjunction with my research on North American hummingbirds and avian brood parasites. Like many other lovers of fine bird art, I had marveled at the Field Museum's 1932 album of Abyssinian plates, but the sight of all the additional, and especially the original, images was overwhelming. I inquired at the time about plans for possible publication of the entire collection, and was told that this was under consideration. Next, I was shown the Museum's set of baby bird portraits by George Sutton, and I immediately broached the possibility of publishing these in book form. That query met with favorable response from Benjamin W. Williams, Special Collections Librarian. This project flourished and during the spring of 1998 resulted in the publication of *Baby Bird Portraits by George Miksch Sutton; Watercolors in the Field Museum*.

As soon as this book appeared I began wistfully thinking again of the Fuertes plates. Then, in the summer of 1998 I made a formal suggestion to Mr. Williams that we consider producing a book containing all the bird paintings and their associated pencil sketches, with the text by me, and the hope that perhaps publication and descriptions of the mammal plates could be taken up by someone more qualified than I. I followed this up in September with a proposed outline for the book, and some preliminary text. I also visited the Field Museum during November, 1998, to examine the paintings and drawings closely, measure them, and discuss possible publication plans. At that time Mr. Williams and I agreed that the mammal plates needed inclusion, since there were too few to warrant a separate publication. I reviewed all the Fuertes drawings and watercolors, and photographed them for personal reference. I also selected out some preliminary pencil sketches and anatomical studies, and a few small watercolors of plant material that seemed too incomplete and data-deficient to warrant inclusion. The text length of each species description is directly related to the number of plates done by Fuertes (roughly 300 word per plate).

One problem in dealing with these plates is the fact that many of the English vernacular names, as well as the Latin names, associated with the species Fuertes illustrated have undergone changes since 1926, and produced to some problems in identification. There were also a few cases of inaccurate identification of the species illustrated. Thus, two appendices have been provided, respectively organized by original Latin names and by original vernacular names, to try deal with these confusing anomalies between my text and the names shown on the plates themselves or used in various publications. Avian taxonomy in this book follows Fry, Keith & Urban (1982–2004). Mammal taxonomy follows Kingdom (1997). There seems to be little agreement as to the proper spelling of Ethiopian place names, and I have modified some of those that were used by Fuertes and Osgood (1936) to conform with currently used spellings.

This review could not have been written without the complete support of the Field Museum of Natural History, and especially its Special Collections Librarian, Benjamin Williams. After Mr. Williams left the Museum, the manuscript lay fallow for several years and I directed my attention toward other projects. Then, in May of 2008, Elizabeth

Babcock encountered a copy of my manuscript among older Museum files. She soon contacted me, and brought the project back to my attention. Later I contacted Dr. Paul Royster, Scholarly Communication director, University of Nebraska-Lincoln, about making the manuscript available on-line through the University's digital library (<http://digitalcommons.unl.edu/>).

In preparing this book I have received assistance from several people. Ms. Linda Brown helped in the indexing and photographing of the plates, and provided a great deal of constructive advice and encouragement on my text. Advice on the identification of the unidentified insect painted by Fuertes was offered by Dr. Brett Ratcliffe of the Nebraska State Museum.

Contents

Preface	2
Louis Agassiz Fuertes: His Art, and his Legacy.	4
Descriptive Accounts	12
Birds	
1. Little grebe	<i>Tachybaptus ruficollis</i> 12
2. White-backed night heron	<i>Goraschius leuconotus</i> 13
3. Black-headed heron	<i>Ardea melanocephala</i> 14
4. Saddle-billed stork	<i>Epihippiorhynchus senegalensis</i> 15
5. Wattled ibis	<i>Bostrychia carunculata</i> 16
6. Sacred ibis	<i>Threskiornis a. aethiopica</i> 17
7. Greater flamingo	<i>Phoenicopterus ruber roseus</i> 18
8. Spur-winged goose	<i>Plectropterus g. gambensis</i> 19
9. Cape teal	<i>Anas capensis</i> 20
10. Yellow-billed duck	<i>Anas undulata rueppelli</i> 21
11. Black-shouldered kite	<i>Elanus c. caeruleus</i> 22
12. African swallow-tailed kite	<i>Chelictinia riocourii</i> 23
13. Black kite	<i>Milvus migrans aegyptius</i> 24
14. African fish eagle	<i>Haliaeetus vocifer</i> (2 plates) 26
15. Lammergeier (Bearded Vulture)	<i>Gypaetus barbatus meridionalis</i> (5 plates) 28
16. Egyptian vulture	<i>Neophron p. percnopterus</i> 31
17. Hooded vulture	<i>Necrosyrtes monachus</i> 32
18. African white-backed vulture	<i>Gyps africanus</i> 33
19. Lappet-faced vulture	<i>Aegypius tracheliotis</i> (2 plates) 34
20. White-headed vulture	<i>Aegypius occipitalis</i> (2 plates) 36
21. Bateleur	<i>Terathopius ecaudatus</i> (4 plates) 38
22. African harrier hawk	<i>Polyboroides t. typus</i> (2 plates) 41
23. Tawny eagle	<i>Aquila rapax raptor</i> (3 plates) 43
24. Long-crested eagle	<i>Lophaetus occipitalis</i> (2 plates) 45
25. Secretary bird	<i>Sagittarius serpentarius</i> (2 plates) 47
26. Pygmy falcon	<i>Poliocerax semitorquatus</i> 49
27. Lanner falcon	<i>Falco biarmicus abyssinicus</i> 50
29. Helmeted guineafowl	<i>Numida meleagris</i> 51
28. Clapperton's francolin	<i>Francolinus clappertoni</i> 52
30. Common crane	<i>Grus g. grus</i> 53
31. Kori bustard	<i>Ardeotis kori struthiunculus</i> (2 plates) 54
32. Black-bellied bustard	<i>Eupodotis melanogaster</i> 55
33. African jacana	<i>Actophilornis africana</i> 56
34. Senegal thick-knee	<i>Burhinus senegalensis</i> 57
35. African wattled lapwing	<i>Vanellus s. senegallus</i> 58
36. Spur-winged lapwing	<i>Vanellus spinosus</i> (1/2 plate) 59
37. Crowned lapwing	<i>Vanellus coronatus</i> (1/2 plate) 60
38. Four-banded sandgrouse	<i>Pterocles quadricinctus</i> 61
39. Bruce's green pigeon	<i>Treron waalia</i> 62
40. Eastern gray plantain-eater	<i>Crinifer zonurus</i> 63

41. White-cheeked turaco	<i>Tauraco leucotis donaldsoni</i> (2 plates)	64
42. White-browed coucal	<i>Centropus s. superciliosus</i>	66
43. Narina trogon	<i>Apaloderma n. narina</i>	67
44. Gray-headed kingfisher	<i>Halcyon l. leucocephala</i>	68
45. Pygmy kingfisher	<i>Ceyx p. picta</i>	69
46. Malachite kingfisher	<i>Corythornis c. cristata</i>	70
47. European hoopoe	<i>Upupa e. epops</i>	71
48. Abyssinian ground hornbill	<i>Bucorvus abyssinicus</i>	72
49. Red-billed ("Hemprich's") hornbill	<i>Tockus erythrorhynchus</i>	73
50. Silvery-cheeked hornbill	<i>Ceratogymna brevis</i> (2 plates)	74
51. Double-toothed barbet	<i>Lybius bidentatus aequatorialis</i>	76
52. Black-throated wattle-eye	<i>Platysteira cyanea aethiopica</i>	77
53. White helmet-shrike	<i>Prionops plumatus concinnata</i>	78
54. Thick-billed raven	<i>Corvus crassirostris</i>	79
55. Cape rook	<i>Corvus capensis kordofanensis</i>	80
56. Red-billed oxpecker	<i>Buphagus e. erythrorhynchus</i>	81
Mammals		
1. Guereza colobus	<i>Colobus guereza abyssinicus</i> (7 plates)	82
2. Olive baboon	<i>Papio anubis</i> (2 plates)	85
3. Gelada	<i>Theropithecus gelada</i> (6 plates)	87
4. Grivet monkey	<i>Cercopithecus aethiops</i>	89
5. Velvet rat	<i>Colomys goslingi</i>	90
6. Abyssinian root-rat	<i>Tachyoryctes splendens</i>	91
7. Slender mongoose	<i>Herpestes sanguinea</i>	92
8. Ethiopian wolf	<i>Canis simensis</i> (2 plates)	93
9. Hyrax	<i>Procavidae</i>	95
10. Mountain nyala	<i>Tragelaphus buxtoni</i>	96
11. Bush duiker	<i>Sylvicapra grimmia</i> (2 plates)	97
12. Klipspringer	<i>Oreotragus oreotragus</i>	98
13. Bohor reedbuck	<i>Redunca redunca</i>	99
Appendices		
1. List of plates, alphabetic by original generic names, museum numbers and sites	102	
2. List of plates, alphabetic by original English names, museum numbers and dates	105	
General References		108
Speciee Descriptions References		111
Index		117

Part 1: Louis Agassiz Fuertes: His Art and His Legacy

It is interesting that, like John James Audubon, Roger Tory Peterson and George Miksch Sutton, we would never think of referring to Louis Agassiz Fuertes in any other way than including his middle name. It is not that there have ever been or will ever be another Louis Fuertes with whom we might possibly confuse him; Fuertes had no comparable antecedent. Dr. Livingstone Farrand, Cornell University's president at the time of Fuertes' tragic death, did not hesitate to schedule a memorial service for him in Willard Straight Hall on the University campus on October 30, 1927. When reminded that such action was without precedent in Cornell's history, Dr. Farrand simply replied, "There is no precedent for Louis Agassiz Fuertes." An so there was none; Like Mozart, he arose from moderate obscurity, exploded in a shower of unmatched talent, and disappeared all too soon, leaving the world to cherish his work but also to grieve and wonder what sort of elemental mix could ever produce such a person.

It is true that Fuertes came from fine parental stock; his father was a professor of civil engineering (and later dean of the engineering college) at Cornell, and his mother was noted for her outstanding musical talent. He had three brothers and two sisters, but none of these would ever attain the heights of fame that Louis would eventually scale. It is also true that his father had high hopes that Louis might become an outstanding architect or engineer, and when Louis entered Cornell in the fall of 1893 he enrolled as an architecture student. He had traveled in Europe with his parents the previous year, studying for a time in Switzerland, and began to exhibit the sort of drawing talent that an architect might need. However, like Charles Darwin, their fathers' dreams were not to materialize, since Louis was far more interested in studying nature directly than in pursuing academic studies. It is perhaps ironic that his father had bestowed the name "Louis Agassiz" on his son in honor of the internationally famous scientist, whose primary maxim was, "Study nature, not books." It is also perhaps apocryphal, but quite possibly true, that once during a class Louis escaped out a side window of the Cornell lecture hall he was attending, in order to track down the identity of a bird he heard singing outside. Finally, his exasperated father sought the advice of Cornell's renowned botanist Liberty Hyde Bailey as to what he might possibly do about his wayward son. Bailey's simple and sage advice was, "Let him go."

And did Louis go! Although his talents would certainly have become known eventually, he was fortunate enough to be discovered by none other than Elliott Coues, then President of the American Ornithologists' Union and perhaps the greatest ornithologist that America ever produced. Serendipitously, Coues was the uncle of a friend and fellow member of the Cornell glee club. The critical initial meeting of Fuertes and Coues occurred in 1894, when Louis was only a sophomore, and during a trip of the glee club to Washington, D.C. From their first meeting it was already apparent to Coues, who was known universally for his sharp critical tongue and feared as an implacable enemy of mediocrity in all forms, that Louis had an artistic talent of immense proportions. Coues urged Louis to consider becoming a professional bird artist (never mind that such a profession didn't exist that that time; even John James Audubon had died in poverty). Thanks to Coues' professional influence, Fuertes was able to have his artwork exhibited at the 1895 (12th) annual meeting of the American Ornithologists' Union in New York. This group then had about 600 members nationwide, including all of America's best-known ornithologists, and its journal *The Auk* was already the primary scientific ornithological periodical in America. Furthermore, Coues invited Fuertes to illustrate a children's book, *Citizen Bird*, that Coues was then writing with Mabel O. Wright. And thus his painting career was launched.

Although Fuertes wasn't able to attend the 1895 meeting of the A.O.U., he did attend the following year. There he fell under the strong and pervasive influence of Abbott H. Thayer, who was already a nationally known nature artist. Thayer accepted Fuertes as a sort of surrogate son, and he spent a great deal of time with the Thayer family at their homes in New York and New Hampshire. Thayer had undergone four years of artistic training in Paris, and urged Fuertes to develop his already keen powers of observation to new levels. Thus, in only two years Fuertes suddenly had the advice of a highly talented and successful painter, and of America's most competent and famous ornithologists. Additionally Coues hired Fuertes to illustrate the fifth edition of Coues' forthcoming (in 1903) *Key to North American Birds*, a reference work that was destined to become the bible of American ornithology, and which even today receives frequent use by professional ornithologists such as myself.

The artistic influence of Abbott Thayer was a powerful one, for it had become an overriding issue with Thayer that animals such as birds primarily had evolved their distinctive colors and patterns for protective (concealment) reasons, rather than perhaps for achieving conspicuousness (advertisement) in their environment. Included in the means of achieving concealment are such devices as disruptive patterning (patterns such as bars, spots, or stripes that tend break up the body into many confusing or distracting forms), background-matching colors (cryptic coloration). Another adaptation is countershading (the tendency of most birds and mammals to have pale underparts and dark upperparts; thus counteracting the shading effects of the underparts caused by overhead light). This concealment argument obviously makes sense for some species, such as for many ground-dwelling or ground-nesting birds that might be vulnerable to visual predators. However, Thayer tried to apply it in many extreme cases, such as trying account for the pink coloration of flamingos and roseate spoonbills by suggesting that they would become virtually invisible at sunrise and sunset, when the general coloration of their surroundings is briefly pink to reddish.

Although some of Thayer's arguments, such as those regarding countershading, were compelling and eventually accepted by biologists, they thrust Fuertes into a nearly lifelong dilemma. He must not only try to satisfy the controversial artistic views of Thayer, who constantly urged Fuertes to hide the birds effectively within their background. He must also attempt to deal with the equally understandable views of virtually all publishers, who always urged him to make the birds more conspicuous and contrasting against their surroundings. Fuertes additionally had to cope with the economics of expensive color printing, which dictated that as many birds as possible must be crowded into a single plate, regardless of the possible straining of credibility that such crowding of subjects might produce. However, an inherent advantage of such grouping, as later exploited by field-guide artists, is the instructional potential for easy inter-species visual comparisons by people wishing to learn field identification traits. It is a testament to Fuertes compositional ability that one may marvel at the multi-species plates in, for example, *The Birds of New York* or *The Birds of Massachusetts and other New England States*, without first thinking about the ecological or behavioral problems inherent in such groupings.

Evidently Fuertes decided quite early that he would primarily be a painter of bird "portraits," rather than painting subject matter in which birds might play an important role within a much broader landscape, in the manner of the great contemporary Swedish nature artist Bruno Lilje fors. Jacques Barraband first perfected such bird portraits, a French artist of the early 1800s, who probably painted his subjects from mounted specimens. Thus, in a self-written 1910 article in *The Amateur Sportsman*, Fuertes described himself as "a bird portrait painter." In 1915 his friend Frank M. Chapman similarly described Fuertes as a "great portrait painter of birds." In a 1937 article, Chapman described Fuertes' genius and compared his approach to art with that of John James Audubon, the other great historic figure in American bird art. Chapman believed that

both men possessed an extreme love for birds, possessing “some rare and precious heritage..” as well as a “loving sympathy” for birds. Both artists killed thousands of birds, either for preservation as scientific specimens or as a basis for painting, yet both obviously and paradoxically loved their subjects intensely. In the words of Wilfred Osgood, Fuertes might sit with a freshly killed bird in hand, “stroking its feathers in detached ecstasy, and crooning over it in a manner that in another might have seemed ridiculous.” In his Abyssinian memoirs Osgood also wrote (1936) that Fuertes was uniquely able to “spread the charm and beauty of birds, not merely by accuracy of line and color, but in the expression of subtle intangible qualities approaching spirituality.” Chapman (1937) stated that, whereas Audubon attempted to produce the visual effect of life by painting his subjects in motion (often inaccurately), Fuertes achieved his visual magic through “his ability to produce facial expressions which could be worn only by living birds.”

Besides an intense appreciation for the appearance of a bird, Fuertes could thus consign to memory a bird’s special qualities that gave it a unique character or “personality,” and delay converting these impressions to paper for several hours after experiencing the scene or event. Frank Chapman commented that “His mind appears to be a delicately sensitized plate designed especially to catch and fix images of bird life” (Chapman, 1927). I have personally known only one artist of similar retentive abilities. Paul Geraghty, a Canadian artist of rare talent, once visited me while I was doing fieldwork in Grand Teton National Park. Paul could spend an entire day in the field with only binoculars in hand, but that night would sit down with pencil and paper and draw dozens of scenes of birds and mammals with camera-like precision, sketching as fast as the graphite would flow from his pencil-tip. Chapman believed that this photographic-like retention of form, color, and even recalling complex bird songs gave Fuertes a special capacity for achieving authenticity. It is rare that a knowledgeable ornithologist will fail to recognize a Fuertes painting well before seeing his distinctive initials or signature; only the works of a few other more recent artists such as George Miksch Sutton can so readily carry the cachet of authenticity that is present in any Fuertes bird portrait.

Starting with a trip to Florida with the Thayer family in 1898, Fuertes soon participated in a series of field expeditions to observe and collect specimens in such remote places as Alaska, western Canada, Mexico, Colombia, and the American West. He even took time to go collecting on his honeymoon, and on one occasion had to be rescued from a steep cliff-face he had climbed down in trying to recover a zone-tailed hawk that he had shot. On such expeditions he would hunt from sunrise to about noon. In the afternoon he would skin and prepare study specimens of the birds he had collected, and then paint selected examples while it was still early enough to paint by natural light. That evening he would enter his journal notes and catch up on correspondence. Fuertes was especially careful to note fugitive “softpart” features, such as the texture and colors of the eyes, bare skin, bill, and even the inside of the mouth or what the bird had been eating when shot. Pencil sketches, washes, and transparent watercolors were variously used; Fuertes’ abilities to depict soft feathers with the brush are legendary, and totally different from the “hard-edged” feathers of Audubon and his followers. Probably many of these field sketches were intended only as preliminary studies for future, more finished works; but they have an immediacy and visual power that is unmatched, and are far superior to what would be expected as specimen studies that might supplement a biologist’s field notes.

During a 1925 trip to Wyoming that Fuertes encountered James E. Baum, a wealthy Chicago sportsman and big-game hunter who was also a fine writer with connections to the Chicago Daily News. The following spring Baum proposed making a hunting trip to Abyssinia (now Ethiopia), a remote area in the great Rift Valley of northeastern Africa that was rich in wildlife but having few if any restrictions on the killing of game. Shortly afterwards Fuertes and

Baum visited with Wilfred Osgood, curator of mammals at Chicago's Field Museum of Natural History. Together they worked out a proposal to have the museum underwrite, not a recreational hunting trip, but a scientific collecting expedition to this little-visited and biologically unknown country. They also approached the *Chicago Daily News* for financial support, and soon received word that the paper would pay \$25,000.00 to help finance the trip. It was thus to become known as the Field Museum/Chicago Daily News Abyssinian Expedition, and would be Fuertes' last expedition. He was 52 years old at the trip's outset in the fall of 1926, at the peak of his artistic powers, and would live only a few months after his return to Ithaca the following year.

The Abyssinian Expedition

The expedition traveled by boat across the Mediterranean from France, through the Suez Canal, and arrived in Djibouti (then part of French Somaliland) in early October of 1926. The group then traveled by train to Addis Ababa, capital of Abyssinia (now Ethiopia). The scientific party included Fuertes, Osgood, and Baum, plus Alfred M. Bailey, a young ornithologist who had very recently been hired as a collector and curator by the museum. The final member was C. Suydam Cutting, a wealthy museum patron and volunteer participant in the expedition, who also made a 16-mm documentary film of its highlights.

After a few weeks of settling in at the Imperial Hotel of Addis Ababa, the group obtained an audience with emperor Haile Selasse (Ras Tafari), then only 34 years old. He was highly receptive to and favorably impressed by the group, and provided them all the documents they would need for travel and collecting throughout the entire country. Before leaving Addis Ababa, Fuertes was devastated to learn that his personal gear, including clothing, field equipment, and all of his drawing and painting supplies had been lost en route. Fortunately, he was able to buy a small set of watercolors in Addis Ababa, and evidently made do with such paper and brushes as were also locally available for his drawing and painting needs. Most of the Abyssinian paintings were done as life-size specimen studies on paper measuring approximately 11 x 15" (28 x 38 cm.), but some sketches are on sheets as small as 7 x 9" (18 x 23 cm.). A few formally composed and more scenic watercolors such as the groups of colobus monkeys, white-eared turacos and mountain nyals were done on sheets as large as approximately 14 x 18" (35 x 46 cm.). These are all undated but were probably all executed after his return to the U.S.

By the latter part of October, before setting out on their main expedition, Fuertes and "Bill" Bailey had each collected and prepared more than 80 specimens in less than a week while staying eight days (October 18-26) at a ranch north of Addis Ababa, in Shoa Province. On October 21 Fuertes painted the first of his bird studies, of an African harrier hawk, and a day later painted a thick-billed raven. These and the remaining watercolor studies were all done in natural size, and thus most of the larger species were simply head and shoulder portraits, often with small whole-animal images in the background. Fuertes also began a large series of variably completed pencil sketches while at the ranch.

On October 30 the entire group reassembled and departed from Addis Ababa, with 36 pack mules, plus dozens of packers, muleteers, cooks, interpreters, and guards. Fuertes and Osgood headed south along the Rift Valley, through Arusi, Bale, Sidamo and Galla provinces. Within three months they returned again to Addis Ababa, reaching there on January 21, 1927. By then Fuertes had preserved 559 bird skins that he had obtained in more than 40 field camps, had already painted nearly 40 field studies of birds and mammals, and made about 20 pencil drawings. During their second month-long stay in Addis Ababa they again visited Haile Selasse, and Fuertes presented the emperor with the choice of a finished painting, to be made from one of his field studies. The emperor chose his portrait of the Narina trogon. On his 53rd. birthday, February 7, Fuertes was in Addis Ababa, packing trunks for shipment to Khartoum and eager to be back in the field. The group left two days later.

Again leaving Addis Ababa, the party headed north toward Gojam Province, into a mountainous region, and across the valley of the Blue Nile. From there they headed west of Lake Tsana. During this phase Fuertes completed an additional 30 or so watercolors, and at least a dozen pencil sketches. One of the last birds to be collected (by Alfred Bailey) in Abyssinia and painted by Fuertes was the African swallow-tailed kite. It was obtained on April 15 near Metema, the westernmost town in Abyssinia (Bailey, 1977). The very last subject for Fuertes' brush was a four-banded sandgrouse, obtained on April 17. Then the group crossed the Sudan-Abyssinian border and arrived in Khartoum on April 24. At this time they began to pack and prepare for shipment 22 cases of their accumulated specimens, including some 2,000 birds and nearly as many mammals. They then headed down the Nile to Cairo and Alexandria, and on to Europe, where Fuertes was reunited with his wife and daughter in London on May 12, 1927 (Mary Boynton, pers. comm.).

On his return to Ithaca, Fuertes had nearly a year's work to catch up with, but he couldn't resist showing the plates to friends and colleagues. During a chance encounter with a young acquaintance, Henry Guerlac, Fuertes called him over, and the two sat down on a sidewalk in Ithaca, feet in the gutter, and "gloated over" the illustrations, oblivious to both oncoming traffic and pedestrians (Marcham, 1971). In a letter written to George Miksch Sutton on June 26, 1927, he excitedly reported, "We had a marvelous trip in Abyssinia, and among other things I got far the best lot of field studies I ever did on one trip; a hundred color studies and a lot of drawings" (Sutton, 1979). Frank Chapman (1928) similarly described his Abyssinian studies as "incomparably the best he ever made in the field." Chapman had seen them as a result of a visit that Fuertes and his wife had made to their home in Tannersville, New York, during which Fuertes had told them of the Abyssinian trip and had shown them his wonderful collection of paintings. Tragically, on their return trip he was killed near Unadilla, New York. A train at a railroad crossing, the view of which had been concealed to them by a load of hay, struck the car that he and his wife were traveling in. Incredibly, at the moment of the crash the packet of paintings was thrown free of the demolished car and was rescued intact. Mrs. Fuertes was also thrown free, but was seriously hurt.

The entire collection of Abyssinian field studies were later purchased from Mrs. Fuertes by C. Suydam Cutting, patron of the Museum and a participant in the Abyssinian expedition, and in due course were presented to the Field Museum. Mr. Cutting also guaranteed the cost of reproduction of a selected group (32) of the watercolor plates, including 28 bird subjects and four mammal studies, or about a third of the total 108 paintings done by Fuertes during the expedition. These were published in album form, and printed on high-quality heavy stock, using up to nine offset lithographic colors, and with image sizes of 20 x 25 cm (8 x 10"). Winfred Osgood provided introductory comments. In 1936 a selection of 16 of these same plates (14 birds, two mammals; all of which were also in the album) were included in a book that represented the combined Abyssinian journal notes of Fuertes and Osgood (Fuertes & Osgood, 1936). These plates were reproduced at slightly smaller size than in the album, and had much narrower borders. Both publications soon went out of print and rapidly became collectors' items. Some of the Abyssinian studies have also been reproduced more recently, most notably in the biographies of Fuertes by F. G. Marcham (1971), which included 12 bird and two mammal portraits, and that of R. M. Peck (1982), which included ten color and eight halftone reproductions of the Abyssinian birds. However, a substantial number of the Abyssinian watercolors and pencil sketches remained unpublished.

Fuertes' Artistic Legacy

The artistic legacy left by Fuertes is both real and symbolic. Frank Chapman (1928) summarized Fuertes' list of "more important" published bird illustrations, which represent a

lasting, substantive artistic legacy. These total at least 400 monochrome illustrations (about half appearing in Coues' *Key to North American Birds*), and at least 700 color plates, with the largest number (250) appearing in the National Geographic's *Book of Birds* (1918), and a lesser number (106) in E. H. Eaton's *Birds of New York*. (1910–1914). There were also 68 plates in E. H. Forbush's three-volume *Birds of Massachusetts* (1925–1929), which are generally considered to be Fuertes' best illustrations, given the limitations of crowding several species on a single plate. A total of 35 color plates and 35 halftones appeared in *The Bird Life of Texas* by H. C. Oberholser (1974), nearly 50 years after Fuertes' death. More than 100 also appeared in the National Audubon Society's *Bird Lore* magazine between 1903 and 1926. These latter plates typically appeared as frontispiece illustrations, and collectively included most American passerines, as well as later series on swifts, hummingbirds, woodpeckers and herons. Several series of small but charming paintings were reproduced on cards published by Church & Dwight between the 1920s and 1940s, and were included free in boxes of baking soda. Such sets were avidly collected by children and introduced many of them (including me) to Fuertes and to many American bird species for the first time. More complete listings of his published plates were provided by M. F. Boynton (1956) and by Frank Chapman (1928) in the *Auk* obituary.

In addition, Fuertes completed many unpublished works on birds as commissioned projects or simply as gifts, as well as many mammal studies and those of other biological subjects. The archival library of Cornell University, which also includes most of Fuertes' surviving papers, has over 2,500 pencil sketches. Thus, his overall output of published and unpublished paintings must have easily exceeded three thousand items, but no complete accounting, or *catalogue raisonné*, exists.

Additionally, Fuertes left a powerful and lasting mark on subsequent generations of American nature artists. Perhaps the person most directly affected by Fuertes, because he received extensive instruction in bird art directly from the master, was George Miksch Sutton. The summer (1916) that Sutton spent in the Fuertes household as a teenager transformed his art and shaped his life. Sutton went on to become the premier bird artist of America following the death of Fuertes, and especially his early work sometimes is so close in style to that of Fuertes that it is sometimes necessary to examine the artist's signature to be certain of its origin. Sutton was himself a great teacher as well as an outstanding scientist, giving advice and encouragement to many talented artists. These have included Robert Verity Clem, whose shorebird paintings carry the authentic smell of tundra and marshland, the late and tragically short-lived Donald L. Malick, whose African field studies often bear an uncanny resemblance to those of Fuertes, and John O'Neill, who knows the visual feel of the American tropics like few others. No bird artist alive is likely to be ignorant of Fuertes' work, and probably all have gazed at his work in wonder, asking themselves, "How in the world did he do that?"

Part 2 Descriptive Accounts

Little Grebe *Tachybaptus ruficollis*

The little grebe or “dabchick” is a dumpy, inconspicuous bird more associated with sleepy African backwaters and stagnant lagoons bordered by or partly overgrown with emergent vegetation than deep, open waters. It bears strong similarities to the least grebe (*Tachybaptus dominicus*) of North America, but its pointed bill has a distinctive yellowish green to whitish base. Like most small grebes, it is perhaps more often seen than heard, and it has a distinctive high-pitched whinnying trill that is used during courtship. Its Latin name, which means a “rapid-diving rufous-necked” bird, is highly appropriate. Like all grebes it can quickly submerge from sight; it is also able to remain under water for long durations if necessary.

The little grebe’s food mostly consists of animal materials, especially invertebrates such as crustaceans and mollusks, and also small aquatic vertebrates, mainly fish and amphibians, which are captured while swimming among underwater plants. Like the pied-billed grebe, the courtship displays of the little grebe are not nearly so conspicuous and elaborate as in the larger grebes, and largely consist of mutual interactions, such as swimming side-by-side, often while holding plant materials in the bill, facing one another while paddling rapidly and uttering trilled notes, or patterning noisily over the water surface. Nesting is done on semi-floating platforms of aquatic plants, the eggs scarcely raised above the water surface, so the female can easily enter or leave the nest with little effort. Incubation probably lasts about three weeks. Like most grebes the young chicks, usually numbering three or four, are charmingly patterned with stripes and spots, but unlike most grebe species, the chicks lack bare areas of skin on the crown. They often ride about on the backs of their parents, and remain dependent upon them for a considerable period after fledging.

Suggested reading: Brown, Urban & Newman, 1982; Chapin, 1932; Cramp & Simmons, 1977; del Hoyo, Elliott & Sargatal, 1992; Newman, 1971.

White-backed Night Heron *Goraschius leuconotus*

The Latin generic name for this species is derived from the Japanese common name for a related form. Its Latin species name and common English name are based on an inconspicuous patch of white feathers on the upper back. Perhaps its most obvious feature is the enormous size of the eyes, which is emphasized by white-feathered “spectacles” and the bright greenish yellow skin between the eye and the bill. The large size of its eyes is doubtless related to the nocturnal foraging behavior of this and other species of night herons. The birds then feed on amphibians, small fish and such invertebrates as mollusks and aquatic insects. During daytime hours they hide in dense vegetation surrounding marshes, or may even retreat into forests. Unlike the extremely widespread but also largely nocturnal black-crowned night heron (*Nycticorax nycticorax*), this is a distinctly solitary species.

The sexes are identically plumaged as adults (although sex or seasonal differences might occur in eye and foot color). Immatures are rather extensively spotted with white on their back and wing feathers. Like other nocturnal herons the birds are fairly vocal, with loud growling or croaking calls. Also like most other herons, nests are rather bulky constructions, and are built of sticks on reeds on branches, or more rarely placed on the ground or a large rock. At times the location may be on a tree branch overhanging water, often only a few feet above the water surface. Typically two or three pale greenish blue eggs are laid, probably at intervals of about two days. Like other herons, incubation begins with the laying of the first or second egg, so the young may hatch at staggered intervals, in the same sequence that the eggs were deposited. Incubation evidently lasts 23–26 days, the task apparently being shared by both sexes, and is followed by a fledging period of 40–41 days. Probably the birds reach maturity by the end of their first year.

Suggested reading: Brown, Urban & Newman, 1982; del Hoyo, Elliott & Sargatal, 1992; Hancock & Elliott, 1978; Newman, 1971.

Black-headed Heron *Ardea melanocephala*

This stunningly beautiful heron not only has a black head and hindneck, but the rest of its body is dark gray to sooty black, except for pale gray to white on the upper wing coverts, white on the foreneck and chin, and usually with a white stripe extending from the back of the eye above it and around the forehead. Young birds are more extensively white on their underparts and are generally paler above. It is about the size of our great blue heron, but is a much more terrestrial species, sometimes occurring rather far from water. Thus, it may forage on a wide array of animal materials, from fishes and crustaceans in water to lizards, rodents, birds and large insects on land. The lizards and birds may be stalked cautiously, with species as large as doves sometimes captured. Occasionally it may also scavenge for offal or carrion. Probably it has benefited from the ecological changes occurring recently in Africa, as it readily tolerates humans and often moves into agricultural areas.

Like most herons, this species roosts and nests colonially. The bulky stick nests are often located in trees, but may also be placed in papyrus thickets or islands. Occasionally the birds may even nest within cities. In common with many herons, males arrive on nesting areas first, and claim territories, either old nests or potential nest sites. When females arrive they choose mates, after which the males begin to gather nesting materials, while the females perform the actual nest construction. Copulation occurs on the nest platform. From 2–6 pale bluish eggs are laid, most often three, at intervals of about two days. Incubation begins with the first egg, so in a large clutch nearly two weeks may separate the hatching times of the youngest and oldest chicks. Rarely do all the young of larger clutches survive; the older chicks can dominate the young ones whenever food is presented, leaving the weaker ones to starve.

Suggested reading: Brown, Urban & Newman, 1982; Chapin, 1932; del Hoyo, Elliott & Sargatal, 1992; Hancock & Elliott. 1978; North, 1963.

Saddle-billed Stork *Ephippiorhynchus senegalensis*

One cannot help but wonder at the size and function of the massive bill of this wonderful stork; its cumbersome generic name is appropriate, and translates as the saddle-billed bird from Senegal. Its colorful bill is almost as robust as that of the carrion-loving and rather grotesque marabou stork (*Leptoptilos crumeniferus*), and it sometimes does scavenge dead fish that have been regurgitated by cormorants. Mostly, however, it forages in shallow water, stabbing or grabbing almost any available prey. These include fish, frogs, crabs, shrimp, and even large aquatic insects such as beetles, evidently at times finding them by tactile rather than visual means. It may also stalk and capture prey on land, including lizards, small birds and rodents.

Although as adults both sexes are identical in plumage, females differ from males in having yellow rather than dark brown eyes. Young birds of both sexes are duller-colored than adults, and require three years to attain their adult plumage and brilliant bill coloration. Curiously, adult birds seem to be completely mute; perhaps the colorful and spectacular bill compensates for the species' apparent deficiencies in vocal communication. In contrast to herons and some storks, breeding occurs solitarily, with the birds maintaining permanent pair bonds. What little is known of their courtship indicates that it is virtually non-existent. Copulation is performed on the nest, which is a surprisingly bulky structure usually placed near the top of a tree, and consisting of branches, vegetation, and earthen components. Like the similar large nests of hawks and eagles, a pair may use their nest in successive years. Also like raptors, males closely attend the nest, and may incubate during much of the day, at night, or when the female is away foraging. There is an approximate five-week incubation period, and a very long fledging period of 70–100 days.

Suggested reading: Brown, Urban & Newman, 1982; del Hoyo, Elliott & Sargatal, 1992; Hancock, Kushian & Kahl, 1992; Kahl, 1976; Newman, 1971.

Wattled Ibis *Bostrychia carunculata*

This curious-looking ibis is endemic to Ethiopia's highlands, and as such is one of this country's truly endemic bird species. It occurs mostly in riverine areas lined by rocky cliffs, but also extends to open country, marshlands and developed areas, and sometimes even extends into villages or cities. Its Latin generic name refers to the species' hair-like crest, rather than to the distinctive but inconspicuous wattles that hang from the throat of adults. Immatures lack wattles, and are generally duller, without the white wing markings that contrast with the otherwise blackish plumage of adults. The sexes are identical in plumage as adults, and both possess wattles. Like those of many birds, these have no apparent function except perhaps being decorative, species-specific signals.

These birds are terrestrial foragers, sometimes feeding socially, and typically walk slowly about, carefully examining and probing the ground, for grubs, dung beetles, or other insects. Occasionally small or baby mice may be eaten, as well as frogs, but little or no foraging is done in water. Like most or all ibises, the birds are highly vocal, uttering a great array of shrieks and crowing calls, especially when alarmed. Choruses produced by flocks may be heard for at least two miles, or about five kilometers.

Breeding occurs solitarily or in small colonies, with nest sites typically being rocky ledges but sometimes including even the ledges of buildings. Almost nothing is known of pair-bonding or courtship behavior, but among ibises generally strong pair-bonds are typical, with the male participating fully in incubation and chick-rearing responsibilities. The nest is a platform-like structure of sticks and branches, and two or three whitish eggs constitute the clutch. In related species incubation requires 25–30 days, which is followed by a fledging period of about 30–35 days, the birds only gradually leaving the nest and its immediate vicinity, and being fed by the parents for some time after their actual fledging.

Suggested reading: Brown, Urban & Newman, 1982; del Hoyo, Elliott & Sargatal, 1992; Hancock, Kushian & Kahl, 1992.

Sacred Ibis *Threskiornis a. aethiopica*

The Latin name of this species means “sacred bird from Ethiopia,” Ethiopia being the European classical name for Africa. Specifically, the Egyptians regarded this ibis as a sacred embodiment of the god Toth, god of wisdom and scribe to the gods, and an ibis outline also was used as a hieroglyphic symbol. The Egyptians often mummified its carcasses as votive offerings, and buried them in mass graves. Collections of more than a million such mummies have been found in areas near breeding sites,. Adult sacred ibis are sexually alike. During the breeding season (March to May in Ethiopia) the birds have ornamental metallic-colored plumes on their scapulars and innermost secondaries. They also have areas of blood-red skin on the wings and adjoining flanks. Immatures have feathered, rather than bare black, heads and necks. The wings are white, but the flight feathers are tipped with black, which makes for a distinctive flight pattern. The birds often fly in goose-like V-formation

These birds are quite social, and nest in colonies of up to several thousand birds, the nests being places in trees, bushes or, in safe island locations, on the ground. Pair-bonds are evidently renewed annually, the males establishing pairing territories and trying to attract females by various postures and calls. These postures include the erection of their ornamental back plumes while standing erect with the bill raised, the partial spreading of the wings and resultant exposure of the bright red skin, as well as various threats or overt attacks on competing males. Once pairing and copulation has occurred, the male begins to gather sticks and branches as nesting material, which the female assembles into a nest. Often nests may be very close together, but only rarely touch. From two to four eggs are laid, with incubation typically starting (at least in Ethiopia) when the clutch is complete. Incubation is performed by both sexes, and requires 28–29 days. The newly hatched chicks are downy and rather goose-like in appearance, but remain in the nest from two to three weeks, when the young begin to leave their nests and gather in flocks. Both parents tend the young, and feed them by regurgitation, even after the chicks have left their nests and been absorbed into these crèche-like groups.

Suggested reading: Brown, Urban & Newman, 1982; Chapin, 1932; Cramp & Simmons, 1977; del Hoyo, Elliott & Sargatal, 1992; Hancock, Kushian & Kahl, 1992.

Greater Flamingo *Phoenicopterus ruber roseus*

Most people have seen flamingos in zoos, but it is quite another experience to see flocks of thousands of them in the wild as, for example, at Lake Nakuru in Kenya, where much of the lake's surface may at times seem to be mostly pink. The swirl of birds overhead, mixed with white pelicans, might almost make one dizzy. In eastern and northeastern Africa the greater flamingo is largely confined to the great Rift Valley lakes, especially those that are variously alkaline or saline. Such water conditions favor the growth of brine shrimp and other small crustaceans that the birds depend upon for food, and from which they obtain the carotenoids that are the basis for their red to pink coloration. The generic name of the greater flamingo means "crimson-winged," and the species and racial names also refer to this coloring.

Like geese, flamingos are highly gregarious, and also in common with geese they have webbed feet, loud voices, and downy young. Yet, these are only superficial similarities, and most authorities now are inclined to believe that the two groups are not closely related. Like all flamingos (and a very few ducks), greater flamingos are filter-feeders. Their sieve-like bills and muscular tongues make effective hydraulic pumps, pushing water through the sides of the bill while extracting the larger food particles. This works best in shallow water, where the birds can wade and remain in place or move slowly about, stirring up the mud and sometimes swinging the bill from side to sides in a scythe-like fashion, gathering the food that is available immediately in front of it.

Flamingo displays are totally different from those of geese and swans, although both groups form strong monogamous pair-bonds, with equal participation in parental responsibilities. Unlike geese, any of the apparent pair-bonding displays of flamingos involve highly rigid postures, such as neck-stretching, bowing, and preening movements that bring to mind the formalized displays of albatrosses.

Suggested reading: Brown, 1958; Brown, 1972; Brown, Urban & Newman, 1982; Chapin, 1932; Cramp & Simmons, 1977; del Hoyo, Elliott & Sargatal, 1992.

Spur-winged Goose *Plectropterus g. gambensis*

This strange-looking goose has an air of the primitive about it; it much resembles the highly archaic magpie goose of Australia, and once was classified with it. But it more closely approximates such perching ducks as muscovies in its anatomy. It is highly terrestrial; a captive pair I often watched while studying waterfowl behavior at England's Wildfowl Trust had a territory centered on a tall hill or "tump," from which the male kept a sharp look-out for intruders. Should any other geese be foolish enough to climb the hill it would be fiercely attacked, sometimes fatally, with the sharp, bony spurs of the goose's wrists serving as deadly weapons.

These birds are widespread in Africa, extending Egypt, Ethiopia and Sudan to South Africa. They are gregarious during the molting season after breeding, when they become temporarily flightless, but breed solitarily. Their voice is weak compared with true geese, and their pair-forming behavior seems to be rather simple and only slightly goose-like. It is possible that the birds are at least occasionally polygynous in the wild, as males have been seen with more than one female, and the marked sexual dimorphism in size might suggest that larger and stronger males may attract multiple females. Like most ducks, but unlike geese, males play no role in breeding following fertilization; all incubation and rearing duties fall on the female. The nest is placed on the ground, in tree cavities, or in trees. The usual clutch is six or seven eggs, but much larger clutches may reflect laying by more than one female. Incubation requires 30–33 days, and the fledging period is apparently very long, perhaps more than 75 days. Once they are capable of flight the birds are probably secure from attacks by many land-based predators. However, the crocodile may pose a significant threat in those limited areas where it occurs, such as in most larger African river systems.

Suggested reading: Brown, Urban & Newman, 1982; Clark, 1980; Cramp & Simmons, 1977; del Hoyo, Elliott & Sargatal, 1992; Newman, 1971; Todd, 1996.

Cape Teal *Anas capensis*

In Fuertes' day this species was generally known as the Cape wigeon, which perhaps is a clue to the uncertainty traditionally associated with its classification. Certainly it has no affinities with the true wigeons, and its pale, ash-gray plumages seemed to me to be ideal camouflage for living in alkaline ponds or lagoons. Indeed, these are favored habitats for the species, whose pale colors are relieved only by a usually concealed metallic green wing-speculum that is somewhat like that of a green-winged teal (*Anas crecca*). The great waterfowl authority Jean Delacour had grouped this enigmatic species in a poorly defined group of so-called "spotted teal," but I never believed that to be an appropriate biological association. It came as one of my greatest surprises and delights when I finally discovered that during courtship this species performs several displays typical of the green-winged teal group, but that are not found in the spotted teal, and I was finally able to find its proper taxonomic "home." Courtship among Cape teal involves several elaborate displays, one of which involves a momentary exposure of the metallic green wing pattern toward the courted female, which occurs so rapidly that on first seeing it a person may wonder if it was only imagined.

Cape teal, in spite of their name, are not limited to Africa's Cape region, but are widespread over much of southern and eastern Africa, and especially common on the Rift Valley soda lakes. They forage at the surface, tipping-up in shallow water, and rarely dive. Their foods consist of small invertebrates and the seeds, stems and leaves of aquatic plants. Like a few other African ducks, pair bonds are quite long lasting, perhaps as an adaptation to allow for exploiting irregular breeding opportunities whenever conditions permit. In association with this unusual trait, males remain with their mates throughout the 26- to 30-day incubation period, and help care for the young during the 50-day fledging period.

Suggested reading: Brown, Urban & Newman, 1982; Cramp & Simmons, 1977; del Hoyo, Elliott & Sargatal, 1992; Johnsgard, 1978; Newman, 1971; Todd, 1996; Winterbottom, 1974;.

Yellow-billed Duck *Anas undulata rueppelli*

The yellow-billed duck is little more than a common mallard (*Anas platyrhynchos*) “in disguise.” In most parts of the world where mallards are absent they have closely related “stand-ins” that occupy their ecological role as a generalized and medium-sized surface-feeding duck. In most of Africa it is the yellow-billed duck, a species much like the North American black duck (*Anas rubripes*) in plumage, but with bright yellow bills in both sexes. The bill color is especially yellow in the Ethiopian race *rueppelli*. Ethiopia is near the northern border of this species’ range; over much of its geographic range it occurs in company with the African black duck (*Anas sparsa*), a species that even more closely resembles the American black duck. However, the African black duck is (like our American black duck) more a forest- and river-dwelling bird, whereas the yellow-billed duck is typically found in open country and in still-water wetlands.

Like mallards, yellow-billed ducks are quite gregarious, and especially after molting and during the non-breeding period may gather in fairly large groups. At this time courtship begins, and pair-bonds are formed. Unlike the Cape teal, there is no evidence of long-lasting pair bonds and irregular breeding in yellow-billed ducks, whose breeding periods are generally timed to start regularly at the beginning of the rainy season (from July to August), and to peak when invertebrate foods are maximally available. Courtship postures and calls are exactly like those of mallards, it is possible that some wintering mallards in Ethiopia may interact with the resident yellow-billed duck population, but the mallards have departed for breeding grounds in Europe before the Ethiopian breeding season gets underway in July or August. By the time the mallards return in the fall breeding by the yellow-billed ducks has been completed. As a result, no hybridization occurs between these birds under normal conditions.

Suggested reading: Brown, Urban & Newman, 1982; Chapin, 1932; del Hoyo, Elliott & Sargatal, 1992; Johnsgard, 1978; Newman, 1971; Rowan, 1963; Todd, 1996.

Black-shouldered Kite *Elanus c. caeruleus*

The raptorial kites of the world are well-named; they can hover kite-like in the sky, remaining nearly motionless as they scan the land below for possible foods, then quickly swoop down and grab it out of the air or vegetation without losing any control or wasting a second of time. Their clean, streamlined lines are an artist's dream, and the large red eyes of this species, contrasting with its steel-gray upperparts, make it especially appealing. The North American version of this kite, which until recently was often included in the same species, is now called the white-tailed kite (*Elanus leucurus*).

Like most hawks, the sexes of the black-shouldered kite are identical in plumage, but the female is slightly larger. Many hypotheses have been advanced to account for such "reversed sexual dimorphism," but none has been universally accepted. One intriguing idea is that smaller and swifter males can perform aerobatic display maneuvers more effectively than can bigger and slower albeit stronger males, and thus be favored by females. Young birds take about a year to attain their adult plumage, but the eye color of immatures becomes bright red by about six months.

Kites maintain localized hunting territories, although roosting during the non-breeding season is communal. Most foraging occurs during daylight, but the birds' large eyes also allows some foraging at dusk. Nearly all prey in Africa consists of small rodents weighing from about a fifth to a seventh of the bird's weight; most raptors can lift prey weighing up to about 30 percent of their body weight. Variations in rodent abundance may dictate the time and even location of breeding, but many pairs seem to maintain strong breeding territories and may use the same nest in subsequent years. Courtship consists of mutual soaring, some chasing, and a "butterfly flight" descent by the male. Incubation and fledging last about a month each.

Suggested reading: Brown, Urban & Newman, 1982; Brown & Amadon, 1968; Burton, 1989; Chapin, 1932; Cramp & Simmons, 1980; del Hoyo, Elliott & Sargatal, 1994; Grossman & Hamlet, 1964; Mendelsohn, 1983; Newman, 1971; Tarboton, 1989.

African Swallow-tailed Kite *Chelictinia riocourii*

Kites were considered sacred birds in ancient Egypt; they were believed to have brought the first book of religious laws to Thebes. Thus sacred scribes wore a kite feather in their caps. Few birds can be more beautiful or graceful in flight than the swallow-tailed kite. Fuertes simply called it the “swallow kite” on his painting, and like the similar fork-tailed species of swallows (and other birds) this unusual tail configuration seems associated with great aerobatic maneuvering abilities, especially at slow speeds. Many fork-tailed bird species are also quite gregarious, although no clear reason for this latter association is apparent. A counterpart American raptorial species is the American swallow-tailed kite (*Elanoides forficatus*), but these two kites are not closely related birds, and only share similar flying skills.

African swallow-tailed kites are very nearly the same size and configuration as the black-shouldered kite except for tail differences; both have large, red eyes as adults and species-specific black-and-white underwing patterning. Both also roost communally, but the foods of the swallow-tailed kite primarily consist of insects caught on the wing, rather than small rodents. Unlike the black-shouldered kite, nesting also occurs in a communal manner; probably its dependence on generally abundant insects makes competition for food during the breeding season much less severe. Nothing is known of the courtship behavior of this elegant bird, and similarly its pair-bonding behavior is little known. There is almost no difference in the sizes of the sexes. It is believed that the female does the majority of the incubation, and she feeds the young with food brought in by the male. Nests are usually constructed anew each year, and are placed in thorny bushes or trees. The usual clutch is of four eggs, but the incubation and fledging periods are still unreported.

Suggested reading: Brown, Urban & Newman, 1982; Brown & Amadon, 1968; Burton, 1989; del Hoyo, Elliott & Sargatal, 1994; Grossman & Hamlet, 1964; Tarboton, 1989.

Black Kite *Milvus migrans*

Fuertes mentioned the great skill with which black kites could swoop down and catch the carcasses of newly skinned rodents when they were tossed into the air for them. Nearly 60 years later I observed that very same behavior while eating lunch in Ngorongoro Crater, the famous wildlife reserve in the heart of Tanzania's Serengeti Plains. I tossed meat sandwich remains high into the sky while dozens of kites circled overhead, all awaiting their opportunities. The black kite (which is actually reddish brown) is one of the commonest of the African raptors, especially in open-country habitats. It is also prevalent near human habitation, where the birds are effective scavengers. Unlike the closely related red kite (*Milvus milvus*) the birds have only slightly forked tails, but share that species' great maneuverability in the sky. The wings are held at an upturned angle, much like that of a harrier (*Circus*) which increases their aerial stability, and they constantly twist and spread their long tails as they adjust their position in the air. Although they can certainly catch some prey such as flying insects with ease, and will take both small live vertebrates and diverse invertebrates, probably the majority of their food comes from carrion. Kites often fly near the front of a grass fire, swooping down on any small animals trying to escape the flames.

The black kites of Africa include many European seasonal migrants, that have less deeply forked tails than the native African birds, and bills that are entirely black in front of the yellow cere. The African birds have yellow bills and a head color that is more brownish than grayish. However, immatures are very difficult to separate.

Like other kites, the black kite is highly social, not only roosting in flocks but also sometimes even nesting in colonies, probably especially in those places where food is not limiting. As suggested by their specific name, these kites are rather migratory, but in spite of their mobility the birds seem to maintain permanent pair bonds. Some courtship does occur among wintering flocks, and acrobatic flights, mutual talon-grappling by potential partners, and exciting pursuit-flights mark these activities.

Nesting is done in bushes or, more often, in the branches or forks of trees. In coastal areas nests may also be placed on cliff ledges. Old nests are sometimes refurbished and used again, or a new nest begun. Kite nests are distinctive in they usually contain an untidy mess of waste materials such as paper, dried dung and other rubbish. Nesting sometimes occurs close the nesting colonies of herons. In some areas the birds may be semi-colonial, with as many as 30 pairs breeding in a cluster. The egg-laying period is evidently quite variable, and may be locally

linked to rainy periods. In nearby Somalia the breeding records are for December-January and possibly also March-April. Usually 2–3 eggs are laid, at intervals of a day or two. Incubation begins with the first egg, and is mainly performed by the female. However, the male feeds his mate during the incubation period, and may remain near the nest. When the female leaves to forage, he will take over nest duties for short periods. Incubation requires 32–37 days, this rather extended range suggesting that better data may be needed, or that incubation periods may vary with variables such as the position of the individual egg in the egg-laying sequence, egg size or clutch size.

The newly hatched young are covered initially with down, but contour feathers appear within a week of hatching, and by the time the young are a month old they are well feathered and easily able to walk about. Fledging occurs by somewhat more than 40 days, but the young remain close to the nest until they are about two months old. Normally only two fledged young are produced per nesting effort, and somewhat more than half of the breeding efforts result in fledged young. As the young birds gain independence the family joins others and flocks gradually form. The age of sexual maturity and initial breeding is still uncertain, but in the closely related red kite occurs at two years.

Suggested reading: Brown, Urban & Newman, 1982; Brown & Amadon, 1968; Burton, 1989; Chapin, 1932; Cramp & Simmons, 1980; del Hoyo, Elliott & Sargatal, 1994; Grossman & Hamlet, 1964; Newman, 1971; Steyn, 1982; Tarboton, 1989.

African Fish Eagle *Haliaeetus vocifer* (2 plates)

Few fresh-water Rift Valley lakes are without their retinue of resident African fish eagles; seen at a distance one might imagine oneself at a remote North American lake, and that the birds are actually American bald eagles (*H. leucocephala*). These two white-headed and white-tailed species are close relatives, and both are well adapted to capturing fish from the water surface, following a low-altitude approach, and a gaffing grab by the long talons. Their calls are also similar, the most common being a series of loud yelps, uttered while the head is thrown vertically back. The Latin name of the African species translates as vociferous sea-eagle, but they also occur on a variety of freshwater and alkaline wetlands.

These birds are common over most of sub-Saharan Africa, extending from coastal areas to at least 13,000 feet (4,000 meters) in the Ethiopian highlands. They tend to be sedentary, occupying the same territory year-around, and using the same nest year after year; 27 years of continuous occupancy has been the maximum duration reported. This would suggest that the birds are potentially very long-lived, but actual data on long-term survival rates are lacking.

African fish eagles, like our American bald eagle, mature in about five years, when their entirely white head and tail coloration is attained. Their adult weight is probably acquired during the first year, when females may weigh up to ten pounds or more (3600 grams), and males up to seven pounds (2500 grams). With this large mass the birds can snag and easily carry off fish weighing more than three pounds, and reportedly can even take prey weighing to up to about five pounds, or half their body weight. Not only fish but also other prey are sometimes taken, including the nestlings of pelicans, herons, spoonbills and cormorants. Even adult flamingos and cormorants are sometimes attacked and killed by these great predators. However, immature birds that are still unskilled at hunting may have to rely on carrion-eating at times.

African fish eagles spend most of their daylight hours perched at convenient look-out points, often a tall tree from which they can survey a large area of water surface. They consume prey that in mass represents an average of about five percent of their body weight per day, or well below amounts typically consumed daily by such more constantly active predators as pelicans and cormorants. This presumably reflect the fact that far less energy must be spent by fish eagles in capturing their prey than is true of active chasers such as cormorants.

The nests of African fish eagles are usually in trees, but at times may be on rock outcrops or even on bushes growing on promontories. In Ethiopia the nesting season occurs between August and October, during the late rainy period. Similarly in Somalia there are records for June and October. Both sexes aid in its construction, and over many years the nest may become so large that the supporting structure breaks and the nest collapses. The usual clutch is of two eggs (rarely three), with incubation starting with the laying of the first egg. Incubation is done by both sexes and probably lasts something over 40 days, and the chicks hatch in the sequence that the eggs were laid. They are mostly fed by the female, who receives food brought to the nest by her partner. At least two months are spent by the young in the nest, and only gradually do they venture far from it after fledging. They may not begin to capture food for themselves until at least two months following fledging, and apparently are allowed to remain within their parents' territory until they leave of their own accord. Young birds may then become somewhat gregarious, roosting in groups where adult breeding pairs will not harass them.

Although protected and generally not persecuted in Africa, the fish eagle has suffered to some degree the same fate as the American bald eagle, namely poisoning by ingestion of

pesticides through its prey. Deaths by dieldrin and other organochlorides have been reported, as have egg-thinning effects similar to those that have occurred in North America.

Suggested reading: Brown, Urban & Newman, 1982:312; Chapin, 1932; Cramp & Simmons, 1980; del Hoyo, Elliott & Sargatal, 1994; Grossman & Hamlet, 1964; Newman, 1971; Steyn, 1960, 1982; Tarboton, 1989.

Lammergeier *Gypaetus barbatus meridionalis* (5 plates)

The lammergeier is one of those almost mythical birds (its English name is based on a German name, meaning “lamb vulture”) that haunt our folklore and legends, if not our dreams. An older but better Latin name for it is “ossifrage,” or bone-breaker, from its legendary ability to drop its prey or their bones from a great height, to break heavy bones on rocks below. The lammergeier’s Latin name is equally interesting; *Gypaetus* means eagle-vulture, suggesting an intermediate ecological position between predator and carrion-eater, which is fairly descriptive. The species name *barbatus* refers to its curious “beard” of bristly and forward-pointed mustache and paired clusters of downwardly-directed chin feathers. The function of these stiff feathers is uncertain, but they may serve a tactile purpose. Its head appears more eagle-like than vulture-like; with very little bare facial skin in front of the eye. Yet the beak is rather slender and somewhat vulture-like, and the toes are also rather small, but the talons are sharper and thus more lethal than those of typical vultures.

I well remember the first time I saw a live, albeit captive, lammergeier, and being awestruck by its piercing yellow eyes encircled by a red sclerotic ring, and its curiously long and wedge-shaped tail. Its tail shape reminded me of the wedge-tailed eagles (*Aquila audax*) I had seen many years earlier in Australia. Presumably in both species this added tail surface area provides for increased aerial maneuverability or perhaps improved braking potential when landing. Fuertes must have also been equally impressed by the lammergeiers; he did more illustrations of them (five) than of any other Abyssinian bird. On November 11, 1926, he watched “great lammergeyers, stateliest and hugest of them all, sail majestically by, sometimes getting with range of Bill’s terrible gun.” The next day Fuertes also watched as a flock of 16 lammergeiers descended on a dead mountain nyala antelope that he had just shot. On that same day he painted one of the birds that A. M. (“Bill”) Bailey had shot on Mount Albassa, at an altitude of 10,700 feet.

Lammergeiers have a very broad historic range in Europe, southern Asia east to Tibet and Africa. At least in Europe they have become very rare and are endangered in most regions, with probably less than 200 pairs surviving in Europe and Russia. In Africa their population is much more secure, with an estimated early 1990’s population of about 1,400-2,200 pairs of this race. They are still most common in Ethiopia, where groups of the size mentioned by Fuertes may still be seen, and some still occur in the South African highlands. In Ethiopia they have become tolerant of, and even dependent upon, humans, frequenting refuse heaps and other waste-sites, and gliding along urban streets to snatch waste from wherever they can find it. This would seem to be a sad fate for a majestic species that one would prefer to imagine skimming mountaintops and steep gorges, far from the nearest human.

Fuertes’ plates show the beautiful tawny to rufous head, neck and breast coloration of these birds, which is the result of staining by iron oxide. The means by which the birds acquire this color is uncertain, but probably results from dusting or bathing in iron-rich sources. This is one of the rare if not unique cases of cosmetic coloration in raptors, and is somewhat comparable to the self-painting of sandhill cranes (*Grus canadensis*), which transform their plumage color from mouse-gray to brownish red by smearing iron-rich mud over their feathers just prior to breeding. As with the cranes, the function of this behavior remains speculative, but at least in the case of the cranes may help to make incubating birds less conspicuous in their dead-grass surroundings.

Like many vultures, the lammergeier roosts on rock ledges or mountainous caves at night, waiting in the morning for updraft winds to help it achieve flight in its daily search for food. Because of its low relative wing-loading, associated with a tremendous wing area lifting a massive but proportionately small body mass (averaging about six kilograms, or 14 pounds), the birds can exploit even slight updrafts to gain altitude and begin long searching flights. They have been seen soaring at heights as great as 25,600 feet in the Himalayas. However, they usually fly rather close to the ground, using the lift provided by updrafts in hilly topography, rather than depending on thermals for maintaining their altitude. The birds glide at rather slow speeds when scanning for food, and have relatively narrower wings as well as obviously longer tails than do most vultures. A foraging pair may cover as large an area as 5,000 square kilometers (nearly 2,000 square miles) when searching for food. Like the other African vultures the lammergeier has quite narrow nostrils (which are largely covered by feathers and thus invisible), and there is no evidence that olfaction aids in its food-searches. On finding carrion, lammergeiers will quickly land, but generally cannot compete effectively with the largest African vultures such as the lappet-faced, or hold their own against domestic dogs.

It takes about seven years for the definitive adult plumage to be attained, at which time the two sexes are identical in appearance, and with the female averaging only slightly larger than the male. Pair-bonding is long-term, and mated birds may remain on the same territory throughout the entire year, sometimes traveling about ten miles from their nocturnal roosting sites for daily foraging. Like other vultures they are nearly always silent, but a few weak whistled vocalizations have been detected during aggressive interactions, pairing display, or when young are soliciting food.

As suggested earlier, one of the most remarkable traits of the lammergeier is its ability to pick up large bones, lift them to considerable heights, and then drop them onto a flat and rocky surface, so as to break the bones into smaller fragments that can be swallowed. Favored sites from such bone-breaking behavior are called ossuaries, and over decades or even centuries hundreds or thousands of bleached bones may gradually accumulate. It is possible that live prey may rarely be dropped; at least in Europe there is fairly good evidence that tortoises may thus be killed and cracked open. It has even been said that the Greek writer Aeschylus (525-456 BC) was killed when a turtle dropped by a lammergeier struck his bald head and produced a fatal concussion.

The behavior associated with bone-breaking behavior has been well studied. Typically the bird will carry a large bone aloft, turn downwind, and begin a rapid descending glide, releasing the bone about 150-500 feet above the ground. There is a remarkable accuracy in such drops; the bones landing on confined surface areas as small as about 12 square yards, from heights of up to about 500 feet. The bird then quickly wheels into the wind, braking its speed, and drops almost vertically downwards, to gather the fragments quickly before other birds steal them. At times other lammergeiers may even catch such bones while they are still in the air, and carry them off to deal with them themselves. The bird may swallow bone fragments up to about ten inches long.

The pairing behavior of the lammergeier is marked by wonderful aerial displays, such as spectacular dives, often close to the nesting site, then quickly climbing to regain height. There are also mutual talon-clutching displays, as in many eagles. Copulation occurs at the nest site, which may be a rocky ledge of a cliff-side cave. Nests of adjoining pairs may be as close as three to six miles apart in good habitats. The nest is large and broad, and is constructed of almost any available materials, including refuse. Both sexes help construct the nest, and a good deal of mutual preening and copulatory behavior occurs during this period. Nests may be used repeatedly, or the materials from an old nest may be used to construct a new one. Either one or two eggs may be laid, at probable average intervals of about five days. Incubation begins with the first egg, and is shared equally, with several nest-exchanges per day. The incubation period is uncertain, but

probably is close to 50 days, judging from observations of captives. Both parents likewise do feeding of the young, the food usually being of fresh meat. Adults also secrete a fluid, presumably semi-digested food, through their beaks and feed the young, as also occurs in some other vultures. Bones, especially small bones, may also be eaten. The fledging period is very long, probably requiring about 120 days. The fledglings remain near the nest and are dependent on their parents for some time after fledging, and then begin their long seven-year period to maturity. By five years of age the head feathering becomes white, and the distinctive black facial mask and mustache becomes conspicuous. Indirect data suggest that there may be as much as a 90 percent mortality of juveniles and immatures before adulthood is attained. Following that, at least in Ethiopia breeding may be attempted only on an alternate-year basis; the climate as well as the long nesting and juvenile dependency periods may make more frequent breeding impossible. Limited data suggest that breeding pairs produce on average only about 0.5 successfully fledged offspring per attempt, so long survivorship must be required if the population level can possibly be maintained indefinitely.

Other than in northeastern Africa there are few places left in the world, such as the Tibetan plateau, where there is much hope of seeing lammergeiers in the wild. The use of poisoned bait, set out for carnivorous mammals, has caused the same kind of damage to lammergeiers in Europe as similar activities have affected California condors (*Gymnogyps californianus*) in the western United States. Like the situation with condors, reintroduction efforts are now underway in some areas such as the Alps, and feeding stations have likewise been provided to compensate for the reduction in available natural foods.

Yet, birds such as California condors and lammergeiers evolved in wilderness environments, and perhaps are wholly unable to adjust to life in the 21st century. It would be sad indeed if this most magnificent of the world's vulture-like birds were to disappear from even the wildest of our planet's remote places. Of all the birds in the world that I should someday like to see in its natural habitat, the lammergeier repeatedly creeps to compete at the top of my list with species such as the great bustard, the Steller's sea eagle, and the probably now extinct pink-headed duck. So far, I have encountered all but the last of these wonderful birds in captivity. I have observed the pink-headed duck only in museum trays, where its once wonderfully if shockingly pink head has faded to a disappointing dingy tan, and its behavior in life forever remains a mystery.

Suggested reading: Brown, Urban & Newman, 1982; Brown, 1990; Brown & Amadon, 1968; Burton, 1989; Cramp & Simmons, 1980; del Hoyo, Elliott & Sargatal, 1994; Grossman & Hamlet 1964; Newman, 1971; Rudebeck, 1961; Steyn, 1982; Tarboton, 1989.

Egyptian Vulture *Neophron p. percnopterus*

The Egyptian vulture's Latin name translates as the trickster-vulture with dark, hawk-like wings. The generic component of the name relates to Greek mythology, in which the trickster Neophron was transformed into a vulture. In spite of its small size and distinctive vulturine appearance, the nearest living relative of the Egyptian vulture may be the eagle-like lammergeier. The Egyptian vulture's head is almost entirely naked, its beak is long, very narrow and only slightly hooked as compared with most raptors, and its legs are rather long, with strong toes and talons. Most of these features would seem to place the Egyptian vulture at a distinct disadvantage as compared with the other African vultures, and perhaps it does best near human settlements, where it might be more adroit and better adapted to living in close quarters with humans than are some of the larger and more clumsy species. It is also unique among African vultures in being mostly white in adult plumage, except for its black flight feathers, although immatures are brown and somewhat similar to the American turkey vulture (*Cathartes aura*) in appearance.

Egyptian vultures are rather solitary birds, not only avoiding larger vultures against which they can't compete, but also not associating much with their own species. They sometimes are seen with hooded vultures; both species have quite long and narrow beaks that allow them to get at food items the larger-billed species can't reach. Certainly the most remarkable facet of their foraging behavior is their stone-throwing ability. On finding a clutch of hard-shelled eggs that can't be cracked with the bill, the bird will pick up a small stone and throw it toward the egg. However inaccurately it does this, an egg may eventually be struck and cracked to the degree that the beak can penetrate the shell, and its contents consumed. For smaller eggs, such as those of pelicans or flamingos, the egg itself may be picked up and hurled against the substrate until it is broken.

Suggested reading: Brown, Urban & Newman, 1982; Brown & Amadon, 1968; Burton, 1989; Chapin, 1932; Cramp & Simmons, 1980; del Hoyo, Elliott & Sargatal, 1994; Grossman & Hamlet, 1964; Steyn, 1982; Tarboton, 1989.

Hooded Vulture *Necrosyrtes monachus pileatus*

The hooded vulture has a rather goulish scientific name meaning a solitary or monk-like corpse-dragger, which is a fairly accurate description. Its monk-like “hood” consists of short white and downy feathers that extend from the middle of the crown back and downwards to the base of the neck, in front of which is bare facial skin that becomes bright red in excitement. The beak is long and narrow, much like that of the Egyptian vulture, but its body and wing feathers are rather uniformly brown, rather than contrasting buffy white and black. The two species are similar in size, with adults of both sexes weighing on average about five pounds, thus both are substantially smaller than most of the typical African vultures. Fuertes mislabeled this species as the “common African vulture” (*Pseudogyps africana*), now known as the white-necked or white-backed vulture.

Like Egyptian vultures, hooded vultures have adapted well to life with humans, often frequenting rubbish heaps and other places where meat scraps or other edible materials might be discarded. Live termites, insect larvae such as dung beetle grubs, and locusts are also eaten when they become available.

Hooded vultures apparently pair permanently, although little detailed information on this or on their courtship behavior is available. At least in Ethiopia they may not attempt to breed annually. The nest, like those of other African vultures, is a small collection of sticks plus an assortment of miscellaneous materials, typically placed in trees near rivers. Nesting in Ethiopia occurs from October to December during the early dry season (which usually extends from November to February), and only a single egg is laid. As usual, both sexes incubate for the roughly 50-day period of incubation. The fledging period is similarly prolonged, probably being rather variable but generally about 100 days. Breeding success seems to be quite low, averaging only about 0.2-0.3 fledged young per pair.

Suggested reading: Brown & Amadon, 1968; Brown, Urban & Newman, 1982; Burton, 1989; Chapin, 1932; Cramp & Simmons, 1980; del Hoyo, Elliott & Sargatal, 1994; Grossman & Hamlet, 1964; Steyn, 1982; Tarboton, 1989.

African White-backed Vulture *Gyps africanus*

These birds are somewhat larger than hooded and white-headed vultures, averaging about 12 pounds, but are not nearly so immense as the lappet-faced vulture. They are perhaps the most commonly encountered vulture on the plains of East Africa, and in Ethiopia are about equally as common as the Ruppell's griffon vulture (*Gyps rueppellii*). The white-backed species is best separated from the Ruppell's by its generally darker color, its shorter neck and darker beak, and its consistently dark brown eyes. The "white-backed" feature is apparent only among adults and when seen in flight from behind or above. When seen from below the leading underwing edge is a distinctive pattern of strongly contrasting white against an otherwise entirely blackish underwing and body.

Gyps is a classic Greek name for a vulture, and this species easily fits the classic vulturine mold. Its head is nearly bare of feathers except for some sparse yellowish down, its beak is powerful and adapted for tearing or stripping flesh from bones, and its feet and talons are rather small and adapted for walking, rather than for killing prey. Its beak is not quite as strong as that of the largest vultures such as the lappet-faced, and it thus has less ability to tear away the skin of thick-skinned mammals.

These vultures are scarcely territorial, and defend only a small area immediately around their nest. Nests are usually in tall trees, especially thorny ones. Although they may build the nest themselves, a pair is likely to claim an abandoned nest of a stork, eagle, or other similar-sized nest. Breeding occurs between October and March, during the drier period, and almost invariably only a single egg is laid. This is incubated by both sexes over the seven-week incubation period. Like other vultures, the fledging period is greatly prolonged, and may last about 120–130 days, probably with substantial variation according to the rate of parental feeding.

Suggested reading: Brown & Amadon, 1968; Brown, Urban & Newman, 1982; Burton, 1989; Chapin, 1932; del Hoyo, Elliott & Sargatal, 1994; Grossman & Hamlet, 1964; Houston, 1976; Newman, 1971; Steyn, 1982; Tarboton, 1989.

Lappet-faced Vulture *Aegypius tracheliotis*(2 plates)

This is the largest of the African vultures painted by Fuertes, with adults averaging nearly 15 pounds, but it is not nearly as huge as the European griffon (*Gyps fulvus*), which may weigh more than 30 pounds, making it one of the heaviest of flying birds. This vulture species, or the closely related cinereous vulture (*Aegypius monachus*) is probably the kind represented visually on the headdresses of high-born Egyptian women; inasmuch as the vulture represented the tutelary deity Nekht from the South, who gave protection to the queens of Egypt. Indeed, both the English name "Egypt" and the generic name *Aegypius* have common Greek origins. The origin of this species' English name is self-evident; *Aegypius tracheliotis* translates similarly from the Greek as "gristle-eared vulture."

This is one of the commonest vultures of Ethiopia, where it ranges up to at least 13,000 feet, and breeds to about 9,000 feet. When soaring, African vultures can reach enormous altitudes. A Ruppell's griffon vulture once struck an airplane flying over the Ivory Coast at a height of 37,900 feet, forcing the plane to land. Studies of vultures on the Serengeti Plains have shown that the birds can travel as far as 45 miles by using a series of as few as six thermals, each rising them to about 4,800 feet. However, a Ruppell's vulture was once sucked into an airplane's jet engine at 37,900 feet above the Ivory Coast!

The lappet-faced vulture's size and powerful beak allows it to dominate all of the other African vultures as carcasses, and its massive beak also enables it to tear away tendons and skin more readily than most or all other East African species. They are often the last of the vultures to arrive at carrion, and are able to rip apart the leftover bits of skin and bones. At times it will attack others with outstretched wings and neck, and with its back and tail feathers raised. Even at such times the birds are generally silent.

Like other vultures, these birds spend the night roosting in trees, patiently waiting each morning for the sun to generate thermals strong enough to provide easy soaring. They may spend as much as eight hours aloft in search of carrion. At times they will also take live prey, such as both young and adult flamingos, as well as their eggs. Prey as large as guineafowl and mongooses have also been reported. Insects such as locusts or termites might be consumed if they are easily available.

These birds have long-term pair bonds, and each pair occupies a large territory that on the Serengeti may encompass from as little as two to as much as ten square miles. Within that territory nesting is usually solitary, but where food is abundant nests may be fairly close together, and sometimes even in apparent clusters. Nests are typically constructed in the tops of trees, especially thorny species, and may be used for several years unless they collapse or otherwise become unusable. Both sexes help construct the nest, and one or both birds will often roost beside it. Breeding in Ethiopia and adjacent Somalia mainly occurs during the dry season between November and January, with extremes between October and April.

Like other large vultures, a single egg is laid, and the long incubation period of about 53 days is shared by both sexes. Even at hatching the curious ear-like head flaps are present. By 70 days of age the youngster is well feathered, but initial flight does not occur until at least 115 days, and normal flight until about 135 days. Thus the entire breeding season requires a half year, and dependence on the parents for food may last another half year, with some young revisiting their nests as long as 293 days after initial fledging. It seems likely that breeding may only occur on alternate years, or at least not every year. However, lost eggs may be replaced if the losses occur early in incubation. Overall nesting success is low; with an average of less than 0.5 young reared

per breeding pair. Since it is likely that breeding efforts are not attempted annually, average overall breeding success is lower than this. The duration of immaturity is apparently still not established, but the adult plumage and probable sexual maturity is attained by four or five years.

Suggested reading: Brown & Amadon, 1968; Brown, Urban & Newman, 1982; Burton, 1989; Chapin, 1932; Cramp & Simmons, 1980; del Hoyo, Elliott & Sargatal, 1994; Grossman & Hamlet, 1964; Mendelsohn & Leshim, 1983; Newman, 1971; Pennycuick, 1976; Steyn, 1982; Tarboton, 1989.

White-headed Vulture *Aegypius occipitalis*(2 plates)

This species, sometimes called the “white-necked vulture,” is one of Africa’s smaller vultures, adults of which are unique in their short downy white head feathers, and also unique in their white secondary feathers. The species’ name *occipitalis* refers to the distinctive head shape, with its curious occipital “bump” of white feathers at the back of the head, producing a rather triangular-shaped profile. Its beak is massive and mostly bright pink, with a bluish base. The bare facial and chin skin can be pink or bright red, depending on the bird’s level of excitement.

Immatures also have a peaked head profile, but the feathers of the head are brownish, the bill is less colorful, and their secondary feathers are dark brown rather than white. When seen from below in flight adults show a similarly distinctive pattern, with their white secondaries contrasting with the blackish primaries. Females differ from males in the extent of white on their flight feathers; like the bateleur, females exhibit more white. This is quite different from the underwing pattern of the white-backed and lappet-faced vultures, whose wings are all black from below, except for a white stripe along the leading edge. It also differs from the Ruppell’s vulture, which not only has a white leading edge but also two additional white stripes on the otherwise blackish under wing-coverts. Immature white-headed vultures are harder to identify in flight, but they have a narrow white line between the blackish under wing-coverts and the slightly lighter flight feathers.

This is a rather uncommon vulture in eastern and northeastern Africa, and because of its relatively small size (about ten pounds) it cannot effectively compete with the larger vultures such as the lappet-faced, at carcasses. Instead it remains at the foraging perimeter, looking for any available scraps, or is found alone at small carcasses not worth the larger vultures’ efforts. It sometimes seems to follow the sharp-eyed bateleurs. This species is often the first of the vultures to arrive at carrion, only to be evicted as the larger vultures also find the carcass. However, it has excellent eyesight and is a persistent searcher.

Like the lappet-faced, it sometimes raids flamingo breeding colonies, eating the eggs and chicks, and may also catch an occasional lizard. Furthermore, by being first at a carcass it may be able to obtain a substantial meal before larger and more aggressive species arrive. It also is a rapid eater, and may be able to fill its crop in as little as two minutes. The species’ long neck also allows it to reach far into the inside of the carcass, to reach the soft interior organs. It may also content itself with quite small carcasses that the larger species might be less likely to fight over.

Over its range these distinctly uncommon birds occur as widely spaced pairs, and like the lappet-faced and other vultures typically place their nests at the tops of trees, especially thorny types. Colonies of up to ten such nests may occur in a cluster of trees. Little is known of pair-forming and pair-maintaining displays, but mutual soaring with the birds’ wingtips close together has been reported as a possible display. In adjacent Somalia the breeding season extends from October to March, with a peak in December and January. Presumably both sexes help build the nest, but there is no hard evidence of this. The nests are typically situated near the tops of dense, flat-topped and thorny bushes. Only a single egg is laid, and the incubation period lasts at least 43 days. Although in most vultures both sexes participate in incubation, it has been suggested that in this species only the female incubates. Fledging requires about 100 days. After fledging the young bird remains close to the nest for several months.

There is only a small amount of information on reproductive success in this species, but it would appear that about 75 percent of the eggs that are laid succeed in hatching, and that about half of the hatched chicks survive to fledging. Thus, perhaps about 40 percent of the breeding

pairs succeed in rearing young to fledging. Since not all pairs breed every year, the annual adult mortality rate must be quite low if the population is to remain stable.

Suggested reading: Brown & Amadon, 1968; Brown, Urban & Newman, 1982; Burton, 1989; Chapin, 1932; del Hoyo, Elliott & Sargatal ; 1994; Hustler & Howells, 1988; Newman, 1971; Pennycuick, 1976; Steyn, 1982; Tarboton, 1989.

Bateleur *Terathopius ecaudatus* (4 plates)

Hardly anyone familiar with raptors can remain unimpressed on first seeing this bird in flight; it would seem to be an unusually large-headed and long-winged eagle that has somehow lost its tail! Its appropriate Latin name means "tail-less bird with a marvelous appearance." The English name provides a clue; "bateleur" in French means a tightrope-walker, who may tilt a bar from side to side to maintain balance. The very short tail contrasts with remarkably long, rather pointed wings, producing an appearance similar to that of a light-weight glider, and the birds are indeed specialized as high-speed gliders. From below the birds present a black-and-white appearance, with the head and body black, while the under wing-coverts are pure white except for the contrasting black tips of the flight feathers.

The wings and tail are not the only unusual features of this bird. Both sexes have thick, ruff-like black neck plumage, and an area of bright red skin extends from in front of the nostrils back to and around the brown eyes. The tip of the upper mandible is orange. The feet are also bright red, and extend back beyond the tip of the tail in flight. Unlike most eagles, the adults are sexually dimorphic; males have all their upper wing-coverts brown, and their secondaries are mostly gray to whitish, whereas females have black secondaries and greater secondary coverts. In both sexes there are two distinct color "morphs," one with chestnut on the upper back (the type illustrated by Fuertes), and the other with cream-colored or pale brown feathers in this area. This latter phase may be more common in drier areas, or possibly is age-related. Immature birds are rather distinctive; it may take seven years for the definitive plumage to be attained. In quite young (first-year) birds the tail is longer than the extended legs, and by the second year they are about equal in length. Gradually the predominantly brown colors of young birds are replaced, and sexual dimorphism in plumages begins to become apparent in birds by the time they are at least five years old. Probably by their sixth or seventh year immatures begin the pair-forming activities that will lead eventually to the establishment of breeding territories. By then their plumage is nearly adult-like, with sexual differences in their flight feathers appearing, and their facial skin turning red. Lastly their under wing-coverts change from mottled brown to pure white.

Bateleurs are fairly vocal eagles, and possess a loud, screaming and barking calls, as well as various softer vocalizations. They vocalize during aerial display, in aggressive encounters, and when defending their nest, as well as in other situations. More common in well grassed and woodland habitats than in arid lands, these birds sometimes are seen at altitudes as high as about 15,000 feet in Ethiopia. Like vultures, they rise soon after sunrise as the temperature rises, and spend much of the day in flight, cruising at surprisingly rapid air speeds of up to about 35–45 miles per hour, and sometimes soaring to substantial heights. It is possible that at least 200 miles might be covered during a single day's activities. During such soaring and especially during long glides the wings often are slightly swept backwards, presumably to gain some air speed. Fuertes' plate shows the somewhat swept-wing appearance of these birds very well. The birds do not fly in tight circles, but rather course about in broad arcs, rarely landing except to feed or drink.

On sighting prey, bateleur eagles undertake powerful attacks, sometimes swooping down from hundreds of yards above, and striking with their strong toes and sharp talons. Prey includes snakes, mammals up to about nine pounds in weight, birds as large as guineafowl or small bustards, and fairly large lizards. At times even insects may be eaten. They are opportunistic foragers, taking more mammals in some areas or different times, and more birds in others. Carrion may also be eaten on occasion, and the birds must have remarkably fine eyesight, as they can locate small items of carrion with surprising speed.

Pairs are permanently formed, and adults appear to be sedentary, with breeding territories scattered over ranges of about one pair per 20 to 75 square miles. During courtship or territorial advertisement display the male may dive from great heights while screaming loudly, narrowly passing the female as she rolls upsides down to present her talons to him. The same or a very similar display might be performed toward territorial intruders. The male may also perform rapid barrel-rolls while in level flight above its territory, or rock from side to side.

Nests are constructed of the usual array of branches and sticks, and are usually placed in the main forks of thorny trees such as acacias in open country. I remember passing below such a nest on the Serengeti plains in a Land Rover, while the parents screamed defiantly from the tree above. At least in some areas the birds seem to prefer nesting near a road or trail, presumably allowing a better view of incoming human traffic. The nest is lined with green leaves, but nevertheless may smell as badly as a vulture's nest. Both sexes participate in building, or in rehabilitating old nests. In Ethiopia nesting occurs between June and December, the birds avoiding the driest period of the year occurring somewhat later. Similarly in adjacent Somalia the breeding season is from July to December.

One unusual feature of the bateleur's breeding biology lies in the fact that a third adult is sometimes present, both during early and later phases of the nesting cycle. This bird has been found to be a male in the observed cases. It has been seen roosting with the paired male as the female incubates, and perhaps will help defend the nest when disturbance occurs. However, the extra bird has not been seen at the nest, nor has it been observed gathering food for the young. It is possible that this extra bird is actually a subadult associating with a breeding pair, and being tolerated ever after the assumption of its adult plumage.

A single egg is the invariable clutch, which is unusual for an eagle, which often have two or three egg clutches. The female performs most of the incubation, but she receives some help from the male, which is unusual among eagles, and on warm days the nest may remain unattended for some time. The incubation period lasts some 52–55 days, and the downy young are mostly white below and dark brown above. By two weeks the chick will have increased with weight five-fold, and by 42 days approximately eleven-fold. The chick's maximum weight, about 20 times that of the hatching weight, is attained by about 70 days, and thereafter there is a slight weight decline. Fledging often occurs at 110–115 days, probably with some occasionally longer or shorter extremes (93–194 days reported) depending on the rate of feeding. These are unusually long incubation and nestling periods for eagles. Much of the daytime period is spent with the adults away from the nest, presumably foraging, and the first flight may often be made without parental involvement.

After a few days the young bird leaves the nest vicinity, but it remains dependent upon its parents for some time thereafter, probably several months. As with most raptors breeding success appears to be rather low; a pair is expected to produce about 0.5 fledged young per breeding cycle. Mortality among immatures is high in all raptors, and by the time sexual maturity occurs at seven years of age probably as many as 97–98 percent of the fledged young have died. This means that the breeding population must include many quite old breeders, and it is possible that a few wild birds may live for 20–25 years. Little good information on bateleur populations exists, but the species has evidently declined everywhere, owing to such things as loss of nesting trees, as well as foraging habitats. In some areas poisoning of carcasses has affected their populations too, and there is also some indications of pesticide poisoning affecting them. The birds may still be seen in several African national parks and game reserves.

The majestic appearance of the bateleur has found its way into African folklore. The Masai of the East African plains, known for their impulsive courage in the face of lions while armed only with a spear, believe the bateleur carries off the spirits of their dead, and especially

those of tribal elders or chiefs. Other cultures have also associated it with warfare or death. Yet, in captivity the birds often become very tame, and make spectacular zoo exhibits. The birds are not yet globally threatened, but their decline in most areas has been substantial and warrants their continued monitoring.

The bateleur is second only to the lammergeier in the number of studies Fuertes devoted to birds on his African expedition. He had a special love for the raptors, and could depict them as few if any artists had done before or have done since. Perhaps only the peer of Fuertes in this regard was the 19th century German artist Joseph Wolf, who also painted magnificent raptor portraits, especially of the falcons.

Suggested reading: Brown & Amadon, 1968; Brown, Urban & Newman, 1982; Burton, 1989; Chapin, 1932; Cramp & Simmons, 1980; del Hoyo, Elliott & Sargatal ; 1994; Moreau, 1945; Newman, 1971; Steyn, 1965, 1980, 1982; Tarboton, 1989; Watson, 1990.

African Harrier Hawk *Polyboroides t. typus* (2 plates)

This rather strange-looking hawk has a Latin name meaning "resembling a caracara," in reference to its similarity to the New World caracaras of the genus *Polyborus*. It is not a very apt comparison, since the caracaras tend to be scavengers, whereas the harrier hawk is an active predator, with unusually long, oddly "double-jointed" legs. These allow the feet to be bent backwards as well as forwards, so the bird can reach into a tree cavity for prey and bend its feet downwards enough to clutch objects at the base of the cavity. Such prey often include the young of cavity-nesting birds such as kingfishers, rollers and barbets. Another odd feather of this species is its "blushing" ability. Its alternative vernacular name "gymnogene" means "bare cheeks," and refers to its mostly unfeathered face, which is usually pale yellow. However, when excited or perhaps threatened this facial skin can rapidly turn bright red, which seems to represent a type of appeasement signal between paired birds.

Harrier hawks are mostly uniform gray as adults, with darker wings, somewhat like male northern harriers (*Circus cyaneus*). Females are larger than males, and have more black spotting on the wing-coverts. However, instead of a white rump as in the northern harrier, the tail is banded with black and white, and the lower flanks and legs are finely barred with black. Immatures similarly resemble the brown females of northern harriers to some degree, but again lack white rump patches and vary in color from buffy ginger to medium brown. Their flight profiles are dissimilar. The harrier hawk has a slow, buoyant and rather "floppy" flight on horizontal broad and rounded wings, rather than the low, coursing flights of true harriers, which remain close to the ground and glide with the wings held upwards at a distinct angle to help increase their aerial stability.

Harrier hawks often hunt by high or low soaring, or may scan their surroundings from perches in a buteo-like style, waiting patiently for the prey to show itself. Or it may climb about on tree-trunks, cliff-sides or embankments, looking for small or large cavities into which it can insert a leg and feel about for living prey. When robbing the nests of colonial weaver-birds it may hang upside-down from a branch above, flapping its wings as necessary to maintain its position. In some areas of West Africa they regularly hunt among the fronds of certain fruiting oil palms (*Borassus*), not only to try locate live hidden prey but also to find and eat the fruit that may be present. Their legs can not only be bent backwards to an angle of about 70 degrees, but are also flexible from side to side, an adaptation perhaps unique to predatory bird as well as birds generally. A closely related species occurs in Madagascar.

Harrier hawks are sedentary birds, with paired adults remaining on their territories year-around. These territories are advertised by undulating flight displays or circular flights that are not very different from the rather circular advertisement flights of true harriers (hence the generic name *Circus*). The birds may also fly in tandem, the female directly below the male. The male may then approach the female and lower his feet to touch her back, at which time she flips over on her back and presents her feet to his. The pair-bond is reinforced by repeated matings both before and during the nesting cycle.

Nests are usually placed in trees, but may sometimes be located in rock crevices at the base of a tree. Seasonality of breeding for Ethiopia and Somalia seems to be unreported. There are usually two eggs in the clutch, and incubation requires about 35 days. Both sexes incubate, but mainly the female, with the male gathering food for her. Typically only a single nestling lives long enough to fledge, the younger and weaker one usually starves. Fledging requires about 50-55 days, but the young remain dependent upon their parents for some time thereafter. At first they

concentrate on easy prey, such as insects. Average breeding success is about 0.5 young per pair, counting non-breeding pairs.

Suggested reading: Brown, 1972; Brown & Amadon, 1968; Brown, Urban & Newman, 1982; Chapin, 1932; del Hoyo, Elliott & Sargatal, 1994; Grossman & Hamlet, 1964; Newman, 1971; Steyn, 1982; Tarboton, 1989.

Tawny Eagle *Aquila rapax belisarius* (3 plates)

This is a fairly close relative to our golden eagle (*Aquila chrysaetos*), but is only about half as heavy. Other races extend over much of Eurasia, where they are sometimes called the steppe eagle. It may be the most numerous of all the larger eagles, and occupies a wide range of fairly open habitats. In Africa the total population may have been about 250,000 birds during the late 1970s, but because of its carrion-eating tendencies it is susceptible to pesticide poisoning. Such poisoning may be the cause of recent population declines in southern Africa. This species is also one of the more migratory of eagles; in Asia the birds breeding in Russia must cross the Himalayas during migration. Carcasses of these birds have been found at 26,000 feet on the slope of Mount Everest, apparently failing in their efforts to cross this mighty mountain range.

In common with other eagles, the period to sexual maturity and fully adult plumage is a prolonged one, requiring several years, probably four. Immature birds tend to be more streaky or blotchy in pattern, and usually have more white on their upper tail-coverts than do adults. They also tend to have broader pale edgings to their larger feathers. Both immatures and adults have barking voices, somewhat like those of corvids, but except during aggressive encounters or during courtship they are fairly quiet birds.

Like all other eagles, females are the larger sex, and adults average about six pounds (maximum of about eight in the African races), whereas males average about five pounds. Prey weighing up to about their own weight may be killed, including very small antelopes, gazelles calves, and bustards weighing up to about four pounds. Thus the birds are very effective predators on fairly large prey, including many so large that they cannot be carried off. They also regularly gather to forage on carrion. They may even eat insects, especially exploiting swarms of locusts or termites. They may also eat lizards and snakes, and are proficient hunters at flamingo colonies, where perhaps they are primarily scavengers. They are also excellent pirates, taking food away from vultures, other raptors, and storks. Perhaps mammals are their most important prey when judged by weight, but birds are more significant when judged by number of prey items.

Both resident tawny eagles and migrants from Europe are likely to occur in Ethiopia; Fuertes painted the resident Ethiopian race "rapax," (now included within *belisarius*) rather than the larger and darker European race *orientalis*. There is an even larger far-eastern race *nipalensis*, which sometimes reaches Africa and may be almost as large as the golden eagle (*A. chrysaetos*) of North America. These two races have at times been regarded as a separate species, but their difference are mainly of size only.

In Ethiopia the birds occur in the highlands up to at least 14,000 feet (4,500 meters), and at these altitudes the birds often forage on mole rats. The European migrants also funnel down the Rift Valley of Ethiopia on fall migration, sometimes in substantial flocks. These fall flocks pass through Ethiopia in October. Spring migration northward occurs during March and April. Breeding by the resident Ethiopian birds occurs from November through December and as late as March, during the dry season. Breeding records from nearby northern Somalia similarly extend from September to February.

Whether migrants or residents, tawny eagles roost from about two hours before sundown until a similar time after sunrise, leaving only eight or nine hours for hunting. They then move to convenient look-out posts, and begin scanning their surroundings for possible prey. Birds may be captured in a diving stoop, may be overtaken in level flight, or sometime may be taken by surprise on the ground. Flamingos can be knocked out of the air, and it is likely that most mammals are chased down. At times garbage sites may be visited, either for the waste materials there or

perhaps to capture rats. Tawny eagles are also effective pirates, frequently stealing food from bateleurs through persistent harassment.

As with other eagles, pair-bonding is permanent, and a breeding pair may occupy a hunting territory of about 10–20 square miles (25–55 square kilometers). This breeding and hunting range is within an overall range or population density of about a pair per 40 square miles (100 square kilometers), with pairs scattered at distances of about 12 miles (20 kilometers) apart.

Within this territory the pair defends and advertises their location. Both birds may soar overhead in tandem, the male may repeatedly dive and regain altitude, or the male may descend toward the female, who in turn will roll over on her back and present her talons to him. This apparent mock-fighting is little different from the swooping attacks of a male on a potential rival intruding into the pair's territory, and it may be impossible for humans to distinguish such behavioral differences, except perhaps from their outcomes.

Like other eagles, nests are typically placed where a commanding view is available, such as at the tops of tall trees, especially thorny or spiny ones. A single nest may be used repeated for up to about three years, after which it may be abandoned and a new one begun nearby. The nest is constructed of sticks and may become quite large, especially after repeated use.

There are usually two eggs in the clutch (sometimes one or three), laid at three-day intervals. Incubation begins immediately, and lasts about 40–45 days, usually closer to the latter. The female does most incubation, but the male also participates. Predation by crows is apparently a serious threat. The chicks hatch at intervals of two or three days, and by two weeks have increased their weight ten-fold. By 56 days they average heavier than their parents, and at that stage are fully feathered. First flights are likely to occur at 75–85 days. Gradually the young develop independence, probably by eating carrion until they become proficient hunters. Within a year the young may drift as far as 150 miles from the nest.

Fuertes' group sketch shows a tawny eagle in frontal head view (below), progressively above which in a tree are a white-headed vulture, two thick-billed ravens, a tawny eagle, a black kite and another tawny eagle.

Suggested reading: Brown & Amadon, 1968; Brown, Urban & Newman, 1982; Burton, 1989; Chapin, 1932; Cramp & Simmons, 1980; del Hoyo, Elliott & Sargatal, 1994; Grossman & Hamlet, 1964; Newman, 1971; Steyn, 1970, 1982; Tarboton, 1989.

Long-crested Eagle *Lophaetus occipitalis* (2 plates)

Few African eagles are more attractive than the long-crested eagle; its long, rakish crest alone identifies it, but additionally the bird appears almost entirely black when perched, with contrasting white edging along the front of the wings, and a boldly banded black-and-white tail. Immatures are scarcely different from adults; the crest is slightly shorter and the eyes of young birds may be more brownish rather than the golden yellow of the adults. The feet and the base of the bill (the cere) are also yellow in young as well as adults. Noisier than the tawny eagle, its screaming call from a nearby tree suddenly woke me up one morning as I slept in a cabin on the rim of the Ngorongoro Crater, providing a perfect symbol of Wild Africa.

These are not very large eagles; adult females average about four pounds, and males perhaps slightly over three. As a result they take few of the prey species used by the tawny eagle, and rather concentrate on small rodents, much like some of the *Buteo* hawks of North America. Probably in some regions both do compete for mole-rats, as this is a common prey item for both. They are rather distinctly a woodland and woodland-edge species rather than open-country birds like tawny eagles, and are likely to be seen on a tall tree or other elevated site, searching intently for prey. Later in the morning they often are seen soaring over more open country, and like many other rodent-eating raptors are quickly attracted to grassland fires, where they can opportunistically pounce on small rodents as they become exposed and try to escape the flames.

Because they are such good rodent-hunters, long-crested eagles not only are attracted to cultivated areas, but also are distinctly beneficial from a human standpoint. Luckily, they evidently do not take poultry, so pose no apparent threat to poultry-raisers. They may, however, take an occasional guineafowl or francolin. Probably over 95 percent of their food consists of small rodents, especially medium-sized rats. They may also eat fruit occasionally, and even hunt for hatchery-raised trout.

Breeding pairs occupy fairly large hunting and breeding territories, perhaps averaging at least 1,000 acres, and generally at lower rather than higher elevations. Breeding occurs from June to August in northeastern Africa, and few if any migratory movements during the non-breeding season are typical. In some favorable years or areas, two broods may be raised in a single year. Pair-forming behavior is not particularly conspicuous, and it is possible that vocalizations are more important than aerial maneuvering when advertising territories. Some undulating flights, swoops and dives have been seen, however, so the general pattern of raptor territorial advertisement is probably present.

Nests are built in trees, often not in thorny species, but instead in introduced eucalyptus trees, whose twigs and leaves make effective nest components. The nests are surprisingly small, often barely hiding the incubating or brooding bird. They may be constructed annually, but sometimes are reused for as many as three years, or the nest of another species may be adapted to their needs.

Single-egg and two-egg clutches are equally frequent, the eggs of multiple-egg clutches being laid at irregular intervals. Incubation begins with the first egg; the male may incubate for short periods, but the female handles most of the 42-day incubation period. If two young are hatched the second may be considerably younger than the first-hatched sibling. In spite of sometimes large age differences, of up to 14 days little or no sibling aggression is typical. It takes about three weeks for the chick to increase its hatching weight ten-fold, and a maximum weight is attained by about 80 days. Initial flight attempts occur by around 55 days. On average about one

youngster is raised per nest. An adult-like plumage is attained during the first year, but presumably initial breeding occurs only after at least two years.

Suggested reading: Brown & Amadon, 1968; Brown, Urban & Newman, 1982; Burton, 1989; del Hoyo, Elliott & Sargatal, 1994; Grossman & Hamlet, 1964; Newman, 1971; Steyn, 1978; Tarboton, 1989.

Secretary Bird *Sagittarius serpentarius* (2 plates)

The secretary bird is as much a “signature bird” of the African plains as are the ungulates or the largest bustards. It can often be seen at a distance, striding purposefully about in the low grasses, its crest sometimes waving about in the breeze, and its bright orange-yellow facial skin conspicuous against its otherwise mostly grayish plumage. At times it seems to be a hawk pretending to be a stork; its long legs and striding gait are stork-like; the neck is long and is extended in flight like a stork’s, and its short toes have rather short claws that are seemingly not very effective in subduing prey. Its prey mainly consists of small mammals, the eggs and flightless chicks of ground-nesting birds, lizards and snakes. This last-named prey category is probably less important than was believed to be true in the past, and which was the basis for the bird’s specific name *serpentarius*. Its common name derives from the long, somewhat spatulate-tipped and blackish crest feathers, which extend backward in a way that brings to mind pencils rather randomly protruding from the hair of a pre-computer era secretary, or the quill-pens of a scribe. These feathers are usually erected halo-like during attacks on prey, perhaps simply as an excitement response or possibly to help scare prey.

Other wonderful features of the secretary bird are its large, hazel-brown eyes and their associated eyelash-like bristles, beautifully shown by Fuertes. Another unusual trait is the long pair of central tail feathers, which extend well beyond the others. Its beak is sharply hooked and certainly raptor-like, but the prey are often subdued by strong kicking movements rather than by crushing the neck vertebrae with the beak in the manner of many raptors. Probably this method allows the bird to deal with venomous snakes while still keeping its more vulnerable areas away from the snake’s fangs. Even cobras and adders may be attacked by secretary birds, which are remarkably quick and dexterous in avoiding being struck. The eggs of larger birds such as francolins and guineafowl are apparently favorite foods too and may be swallowed whole; even lost golf balls are sometimes have been mistaken for eggs and swallowed. Secretary birds are still fairly common in the drier parts of Africa, and their snake-eating abilities have generally earned them both respect and protection.

Secretary birds range fairly widely in their daily hunting expeditions; the birds usually hunt in pairs, and a pair may occupy a remarkably large hunting and breeding territory of about 8-27 square miles (20-70 square kilometers). To cover this broad area the birds may resort to flight; on warm days they may use thermals to gain altitude and circle about, presumably to scan the land below for possible prey, or perhaps to advertise their territorial ownership. Aerial display also occurs during courtship, when soaring and calling are common, as are “pendulum flights,” when the bird stalls, swoops down with wings mostly closed, then pulls out of its dive only to gain altitude again and repeat the process.

Within their territory the pair selects a low but thorny tree, usually a flat-topped acacia, for their nest. This is a surprisingly large and bulky structure up to as much as about eight feet in diameter. The usual clutch is of two eggs; curiously they are rather chalky in texture, looking more like those of storks than hawks. However, like hawks and eagles, the female is slightly larger than the male and performs most or sometimes even all the incubation. On returning to the nest to take a turn at incubation, a leafy branch or other green vegetation is typically presented to the incubating bird, who then rises and performs a bowing display while calling and fanning the tail. This unusual nest-relief ceremony has some similarities to those of storks.

Incubation lasts about 45 days, and the hatched chicks have pale gray down. Their eyes open only a few hours after hatching, and they begin feathering out in a few weeks. However,

their fledging period is quite prolonged, usually lasting 75–85 days, but with variations in feeding rates might range from 65 to 106 days.

Suggested reading: Brown & Amadon, 1968; Brown, Urban & Newman, 1982; Burton, 1989; Chapin, 1932; del Hoyo, Elliott & Sargatal, 1994; Grossman & Hamlet, 1964; Steyn, 1961, 1982; Tarboton, 1989.

Pygmy Falcon *Polihiex semitorquatus*

This charming little falcon is even smaller than our American kestrel (*Falco sparverius*), and more like that of a shrike (*Lanius*) in both size and appearance. Its Latin name means “gray hawk with a semi-collar,” the latter name referring to the pale band around the back of the neck. The sexes differ as adults in that females have a chestnut rather than a gray back; immatures of both sexes resemble adult females but have buff-colored breasts. Like the world’s other tiny falcons it is relatively large-headed and short-tailed. The species is common in semidesert habitats of Ethiopia and the Rift Valley of East Africa; a second widely separated population also occurs in the Kalahari Desert region of southwestern Africa.

This tiny insect-eating falcon is usually found in scattered pairs, perching in low lookout points, and making short sallies out to capture large insects, small lizards, and occasional small birds. They often roost in company with various colonial weaver-finches, and occasionally prey on the adults of these birds or their nestling young.

In northeastern Africa they nest from June to December, and perhaps are double-brooded in some regions, depending on food supplies. Normally monogamous like most raptors, sometimes females have been reported to be polyandrous, the extra male presumably aiding in the rearing of two broods during a single season. With the start of the breeding season a pair typically takes over an old nest of a weaver-finch (*Plocepasser*, *Philetairus*, or *Dinemelia*), which are usually located in densely thorny trees.

The clutch consists of two to four white eggs, which are incubated by both sexes, but mostly the female. After the four-week incubation period there is another four to six-week fledging period. Predation levels seem to be slight, owing to the secure nest sites.

Suggested reading: Brown & Amadon, 1968; Brown, Urban & Newman, 1982; Burton, 1989; Cade, 1982; del Hoyo, Elliott & Sargatal, 1994; Grossman & Hamlet, 1964; Maclean, 1970; Newman, 1971; Steyn, 1982; Tarboton, 1989.

Lanner Falcon *Falco biarmicus abyssinicus*

This highly attractive falcon has a broad range through southeastern Europe, Arabia, and Africa, where it is the near counterpart of the peregrine falcon (*Falco peregrinus*). These two species overlap across much of their African range, but the lanner falcon extends into more desert-like habitats than the peregrine. It is on average also paler, and has a brown crown and hindneck that is distinct from that of the dark-headed peregrine. Like the peregrine, its prey consists mainly of birds that are usually taken in flight during powerful stooping dives from as high as several hundred yards. It sometimes also takes mammals during low-altitude attacks similar to those typical of the North American prairie falcon (*Falco mexicanus*).

Lanner falcons are resident wherever they occur in Africa, with pairs occupying large breeding and hunting territories of close to 20 square miles (40-50 square kilometers). Within the Ethiopian region they are the most common large falcon, perhaps being more versatile in their prey spectrum than the similar-sized peregrine. Outside the breeding season lanner falcons become more insectivorous, gradually shifting to birds as the nesting season approaches. Birds the size of quails and doves are often taken and perhaps preferred.

Nesting is done in tall trees; often the old nest of a crow, kite, or other large raptor may be taken over. Few if any raptors are likely to challenge a pair of lanners for their chosen site, and none are tolerated anywhere near the nest. The clutch usually consists of two or three eggs, and only the female is known to incubate. The eggs hatch at staggered intervals after approximately 30 days, and thereafter the male brings food for both the female and their chicks. Fledging requires another 42–45 days.

Suggested reading: Brown & Amadon, 1968; Brown, Urban & Newman, 1982; Burton, 1989; Cade, 1982; Chapin, 1932; Cramp & Simmons, 1980; del Hoyo, Elliott & Sargatal, 1994; Grossman & Hamlet, 1964; Steyn, 1982; Tarboton, 1989.

Helmeted Guineafowl *Numida meleagris somaliensis*

This is by far the most widely recognized species of guineafowl, as it is the only one to have been domesticated. It is also very widely distributed in sub-Saharan Africa, occurring in savanna, semi-desert, and other open-country habitats wherever a source of available water and elevated roost-sites can be found. The Abyssinian race *somaliensis* is found in most arid habitats of Ethiopia and Somalia. The name “helmeted” refers to the horn-like casque on its head; Fuertes’ name “tufted guineafowl” is more applicable to a related species that bears a feathery crest, although the Ethiopian race bears a tuft of long hair-like feathers on its forehead.

Helmeted guineafowl are highly social, and roost colonially in traditional tree roosts. Only during the breeding season do flocks fragment into pairs. Social living has the advantage of multiple eyes and ears for detecting predators; a frantic run to cover follows an alarm call from any of the flock members. During much of the year the birds forage on seeds and other vegetative materials, supplemented by insects. With the breeding season onset monogamous pair-bonds are formed, but no real territoriality develops. Rather, the male simply defends his mate from the attentions of other males.

Nests are well hidden on the ground and, like most gallinaceous birds, the female lays a fairly large clutch of 6-12 eggs. Most laying occurs during the relatively rainy period of July and August, but variable rain cycles can modify this sequence. The male plays little or no role during the 24- to 27-day incubation period, but returns after hatching to help rear the precocial chicks (which in East Africa are often called “keets”). By two weeks the chicks are flying weakly, and by a month of age are flying strongly. There is usually a high mortality rate among the young, but a few may survive to join the flocking adults by the time they are a few months old.

Suggested reading: Chapin, 1932; Cramp & Simmons, 1980; del Hoyo, Elliott & Sargatal, 1994; Newman, 1971; Skead, 1962; Urban, Fry & Keith, 1986.

Clapperton's Francolin *Francolinus clappertoni*

The francolins of Africa are a large and diverse group of partridge-like birds, of which the Clapperton's francolin is one of the bigger species. Francolins are notable for the sharp spurs on the legs of males and, in many, bright red patches of bare skin around the eyes of adults. They are otherwise not very brightly colored, but most species have loud, sometimes raucous, vocalizations. The generic name comes from a French word meaning "little hen." The Clapperton's francolin was named after Hugh Clapperton, a 19th-century Scottish explorer of tropical Africa, and is usually found in quite arid and sandy grasslands, where its pale plumage makes effective camouflage. It is notable for its bright red legs, a rather "scaly" grayish plumage pattern, and a loud, grating call.

Adult males are heavier than females by about 30 percent; females are not only smaller but have much shorter spurs. It is likely that spur length in males is age-related, and probably is an important determinant in mate acquisition. Although presumably monogamous, social dominance among males is likely to be established by fighting

Like guineafowl, francolins tend to roost socially in trees at night, and are found in small coveys or as separate pairs during the day. Breeding records for Ethiopia extend from April to December, plus a February record. Little is known of the details of breeding; the clutch-size and incubation period are both unknown. However, in most francolins the clutch is generally about six to eight eggs, and the incubation period lasts about three weeks. The young are highly precocial, and are likely to fledge in only about two weeks. In some other francolin species the percentage of young birds in post-breeding flocks runs about 30-35 percent, suggesting that this might approximate adult mortality rates. Adult francolin plumages are reached within a year, so presumably yearlings are potentially able to reproduce. These birds are still fairly common in most of their range, but may be declining in Ethiopia's Rift Valley, owing to habitat changes.

Suggested reading: del Hoyo, Elliott & Sargatal, 1994; Johnsgard, 1986; Urban, Fry. & Keith, 1986:56.

Common Crane *Grus g.grus*

Common cranes are so-named for their relative abundance in Europe, not Africa. Most of these European birds winter north of the Mediterranean Sea, but many also funnel down the Nile Valley to winter in the headwaters of the Blue Nile of Ethiopia, plus the upper Nile basin of Sudan. It is uncertain where and when Fuertes painted his specimen; three species of cranes were mentioned as being seen near the Kalata River on November 3, 1926, but it is more likely that the one Fuertes painted was collected at Lake Tana, in early April of 1927. This would be near the eastern limits of the species' current wintering range in Africa.

Cranes are rife with folklore and myth, and most of these tales involve the common crane of Europe. They are almost always associated with good fortune and prospective happiness, and often cranes are considered bellwethers of the changing seasons. In part this results from their large, almost human-like shape and posture, but their longevity, strong pair bonds and their family and flock unity also play an important role. Lastly, their clarion voices excite the human spirit in a remarkable way that somehow seems to remind the subconscious of a time when early humans and cranes shared the East African plains in harmony millions of years ago.

Common cranes winter in Africa from September to April, with most of the birds wintering in the Sudan along the Nile Valley. Here they gather in flocks sometimes numbering more than 1,000 birds, spending the daytime hours foraging in fields and wet meadows, gleaning from the ground surface or probing for food. In the evening they return to traditional safe roosting sites; often these are areas of shallow water in which the birds can easily stand and pass the hours of darkness in relative safety from terrestrial predators. Even during the darkest hours some birds remain awake, and maintain low levels of conversational vocalizing.

Suggested reading: Cramp & Simmons, 1980; del Hoyo, Elliott & Sargatal, 1996; Johnsgard, 1983; Urban, Fry & Keith, 1986.

Kori Bustard *Ardeotis kori struthiunculus*(2 plates)

One of the birds I most wanted to see when first visiting East Africa was the kori bustard; it is one of the largest bustards, indeed one of the heaviest of flying birds. Its stately demeanor as it strides about the plains on its long legs reminds me of nothing so much as a Masai warrior. Its generic name means “heron-bustard,” and the specific and vernacular “kori” comes from a native name used in Botswana. The birds do have rather long, almost heron-like necks; but the neck area is covered by long hackle-like feathers that resemble a Victorian ruff even when they are not erected. Indeed, male kori bustards spend a good deal of time during the breeding season standing in a stately posture, with neck extended vertically and their feathers fully raised, producing a stove-pipe or even a balloon-like outline. In this stance they utter a series of low-pitched notes that, if they lack volume, nevertheless carry well across the African plains, and probably attract females. The acoustic effect is multiplied visually by a tail-cocking that exposes white undertail feathers.

These remarkable displays would suggest that the males are polygynous if not promiscuous, and their much larger size than the females (nearly twice as heavy, or about 22 pounds versus 13 pounds) supports this view. Like other arena-birds, adult males sometimes gather in traditional display areas, or leks, to try establish dominance and thus gain access to any and all females that may be attracted to the group.

Females closely resemble males in plumage, but are much more wary, and thus are hard to see. Following mating they locate a nest site, which is simply a shallow scrape on the ground that is often hidden by grass clumps or a rock outcrop. They deposit one or two eggs, and then undertake the four- or five-week incubation period. The chicks are precocial and able to walk about soon after hatching, but they continue to be fed occasionally by the female long after they are seemingly independent of such needs.

Suggested reading: Ash, 1989; Chapin, 1939; del Hoyo, Elliott & Sargatal, 1996; Johnsgard, 1991; Newman, 1971; Urban, Fry & Keith, 1986.

Black-bellied Bustard *Eupodotis melanogaster*

Unlike the kori bustard, this is a bird little larger than a pheasant or grouse, and its neck feathers are very short, producing a thin-necked but thick-bodied profile. It is quite common on the grasslands of sub-Saharan Africa, especially in moderately tall grasslands and savannas such as the Masai Mara. Bustards are generally noted for their wariness, and I was surprised to see that at least males could be approached fairly closely (at least in protected game parks) during their display period. At this season the males stand in conspicuous locations and utter a series of rather odd whistles, cork-popping and hiccuping sounds, accompanied by head-retracting and neck-extension movements.

Bustards reach their greatest abundance and diversity in Africa; they are distant relatives of cranes and share some crane-like attributes. However, they are superbly adapted to life in dry environments. They are also much less gregarious than cranes, perhaps because they live in areas of sparse food resources. The black-bellied bustard contradicts the general protective-coloration principle of countershading that was proposed by Fuertes' mentor Abbott Thayer. There are some other curious exceptions to this principle, such as the black-bellied plover (*Pluvialis squatarola*) and some other tundra-nesting shorebirds, and the honey-badger or ratel (*Mellivora*) among African mammals. Perhaps the ratel is aggressive enough so that it can ignore selective pressures for protective coloration, but it seems likely that the black underparts of plovers and several bustard species must have visual display functions (perhaps during aerial display) or other advantages not immediately apparent. It is true that females and immatures of the black-bellied bustard have white underparts, as might be expected for protective reasons.

Like other bustards, only the female plays a significant role in the nesting and parental phases of reproduction. The nest is a simple scrape, and one or two eggs are the usual clutch. Little else is known of the breeding biology of these elusive birds.

Suggested reading: Ash, 1989; Chapin, 1939; Chapin, 1939; del Hoyo, Elliott & Sargatal, 1996; Johnsgard, 1991; Newman, 1971; Urban, Fry & Keith, 1986.

African Jacana *Actophilornis africana*

Jacanas are one of the most interesting of all shorebird groups. They are one of the very few types of shorebirds (phalaropes are the other) in which there is a reversal of sexual appearance and sex roles. Beyond that, jacanas have extraordinary long toes and claws, which allow them to spread out their weight to the point that they can walk or run over lily pads and other floating vegetation without sinking. They are thus sometimes called lily-trotters. The term jacana is derived from a Portuguese interpretation of a native Brazilian name for the group; the bird's Latin name means "African beach-loving bird." Like other sex-reversed birds, females are appreciably larger than males, but do not differ noticeably in brightness of their plumage or in the color of their blue frontal shields. The frontal shield color varies with age, and becomes brighter during the breeding season among adults.

Nearly all jacanas are rather retiring birds, associated with overgrown ponds, weedy marshes and temporarily flooded lands. They forage on invertebrates caught at or just under the surface, either while walking on the surface vegetation or, occasionally, riding on the backs of hippopotami. Like coots and moorhens of the same general habitat they are strongly territorial, and utter rather loud croaking or screeching notes when advertising or defending their "turfs."

Although some females remain monogamous, many females acquire two or even as many as four males. These extra ("minor") males defend individual small territories surrounding that of the major male and the female, and keep other minor males out. Al, however, participate in repelling invaders from the group's collective territory. Females lay clutches of about four eggs (these presumably having been fertilized by the primary mate), and only the male performs incubation. The female may visit the nest periodically during the approximate three-week incubation period. The newly-hatched chicks are charmingly gangly; their feet and toes are about as long as their entire body; and they are longitudinally striped from head to tail.

Suggested reading: del Hoyo, Elliott & Sargatal, 1996; Johnsgard, 1981; Newman, 1971; Tarboton, 1992; Urban, Fry & Keith, 1986.

Senegal Thick-knee *Burhinus senegalensis*

Thick-knees are so-named for their somewhat swollen “ankle” joints; they are a mostly Old World group of aberrant, mostly arid-adapted shorebirds that reach their greatest diversity (four species) in Africa. The Senegal thick-knee occurs across the semi-desert Sahel zone just before the Sahara, but also extends northward up the Nile Valley to its delta. All thick-knees have relatively large heads and eyes, as well as cryptic plumage patterns that allow them to disappear in the sparsest of cover, or even on bare sand. They have a distinctive wide-eyed but skulking appearance, and hunt visually for invertebrates at or just below the ground surface. They may also opportunistically take amphibians, small rodents and the eggs or young of birds they might encounter. Some foraging occurs at night, as is suggested by their large eyes.

The Senegal thick-knee is about the size of a small curlew (*Numenius*), and has a curlew-like wailing call that serves as a general alarm call to all in the vicinity. A related species is called the stone-curlew; it is very similar in size and appearance to the Senegal thick-knee. The sexes are alike among thick-knees, and pairing is monogamous. The birds tend to be rather solitary, or at most only slightly colonial. They breed rather independently of the rain cycle, often on rather rocky or pebbly substrates, where the adults, the spotted brown and buff eggs, and the dappled brown young are all virtually impossible to detect visually.

Typically two eggs are laid. They may be surrounded by pebbles, rock or wood fragments or other objects that probably help conceal the eggs when the incubating bird is away from the nest. At least in related species both sexes take their turns in incubating, and the eggs hatch in about four weeks. Like other ground-nesting shorebirds the adults are adept at performing nest-distraction displays by feigning injury, thus effectively luring small mammals such as jackals away from the clutch or brood.

Suggested reading: Cramp & Simmons, 1983; del Hoyo, Elliott & Sargatal, 1996; Urban, Fry & Keith, 1986.

African Wattled Lapwing *Vanellus s. senegallus*

Lapwings are a group of shorebirds averaging slightly larger than our killdeer (*Charadrius vociferus*), and which have their greatest species diversity and abundance in Africa. Like killdeers, they are noisy, alert birds that often have colorful facial wattles or crests, contrasting wing plumage patterns most visible during flight, and bony wrist protuberances or even spurs. The last-named feature is probably related to the establishment of individual social dominance, and their other visual traits are probably also important in related social signaling. Lapwings get their descriptive name from their rather deep, flapping flight; “lapwing” was gradually corrupted in the English language to become lapwing. Lapwings are sometimes also called “picket-plovers,” since they maintain a sharp picket-like lookout for all possible signs of danger, and loudly utter alarm calls when threatened. Some of the African species are also called “blacksmith plovers,’ their ringing cries resemble the sound of a blacksmith pounding on metal. Other species may thus profit from their constant and reliable alertness.

The wattled lapwing has distinctive yellow wattles hanging down from the base of its bill, a red and white forehead, and a black chin. Like other lapwings its wing pattern is a strongly contrasting black and white. The sexes are alike, both in plumage and weight.

Wattled lapwings are monogamous, the pairs usually inhabiting generally moist grasslands and the edges of watery habitats, but at times foraging on quite arid sites. They are not very gregarious, and tend to be somewhat migratory, moving about as the rains come and go. The birds are highly territorial, the territories often a few hundred yards in diameter. Most territorial advertisement and defense are performed by the male, but he is sometimes aided by his mate. Both sexes incubate the three or four eggs for the month-long incubation period, and both help to rear their chicks during the 38–44-day fledging period.

Suggested reading: del Hoyo, Elliott & Sargatal, 1996; Johnsgard, 1981; Urban, Fry & Keith, 1986.

Spur-winged Lapwing *Vanellus spinosus*

The spur-winged lapwing has short but sharp spurs at the bend of each wing; these are effective in driving off rival males, but are of little value in defense against most predators. Like the other lapwings it is a highly attractive bird; adults of both sexes are contrastingly black and white on their head, body and wings, although like other lapwings their back is the color of dry sand, and provides a degree of concealment for crouching or incubating birds. Adults of the two sexes are virtually identical in size and appearance, but the female has a brownish rather than a reddish eye. The species is distributed just south of the Sahara in a manner similar to that of the wattled lapwing, but generally prefers drier habitats than does that species. It has a loud, screeching and usually four-syllable cry, sometimes transliterated as "Did he DO it?" The birds often forage on dry ground or at the edge of water, taking a variety of arthropods and occasional small lizards.

Like other lapwings, these birds are highly territorial, evicting not only other lapwings but also various other shorebirds from their territories. Because of their sharp spurs they can readily dominate wattled lapwings, but they may avoid fights with similarly spurred species.

These monogamous birds seem to maintain permanent pair-bonds, and tend to be rather sedentary. In very favorable habitats they may nest fairly close together, but maintain definite territorial boundaries nonetheless. Courtship (pre-copulatory display) by the male includes ceremonial nest-scraping, a hunched circling of the female while walking stiffly, and head-bobbing.

Typically three or four eggs are laid, and both sexes incubate. Breeding records in Ethiopia and Somalia are widely spread, from March to January. Incubation and fledging periods are similar to those of other lapwings. In some areas two broods may be produced per year, although this is not proven for Ethiopia.

Suggested reading: Cramp & Simmons, 1983; Johnsgard, 1981; Urban, Fry & Keith, 1986; Ward, 1989.

Crowned Lapwing *Vanellus c. coronatus*

Of the three African lapwings depicted by Fuertes, this is the most southerly, and the only one with red legs and bill coloration. It is also one of the most common of the African lapwings, occurring in a variety of generally dry country, especially overgrazed grasslands. Therefore it benefits from the spread of domesticated livestock, and is often an indicator of poorly managed grazing land. This species lacks wing-spurs, and so is generally less aggressive than the spur-winged plover. The forehead is black, which color extends back behind the eye, and a separate black "crown" is set off by a white margin. The wings and tail are also patterned with black and white. The sexes are alike in plumage, but females average slightly smaller than males.

The crowned plover reaches the northern edge of its range in central Ethiopia, but tolerates very dry and even highly sandy substrates. Insects and their larvae are the standard food, and the birds are attracted to grass fires that may expose a varied of easily available insect prey. In some locations the birds may also make regular daily flights to foraging areas. Much foraging occurs at dusk, and may continue on after nightfall

Like other lapwings these birds are normally monogamous; breeding records from Somalia extend from January to October. In areas of high density nests may be placed as close as about 25–30 yards apart. Eggs are laid at intervals of one per day, and the usual clutch is of two or three eggs. The spotted eggs often perfectly match their pebbly background, but the nest site is also actively defended by the pair. At the first sign of danger the bird on the nest will quietly leave it and take up a defensive stance some distance away. Nest-distraction display may be used if the predator can't effectively be repelled through threats. Incubation and fledging periods are about 30 and 40 days respectively, and both sexes play equal roles.

Suggested reading: Ade, 1979; Chapin, 1939; del Hoyo, Elliott & Sargatal, 1996; Ginn, McIlroy & Milstein, 1989; Newman, 1971; Urban, Fry & Keith, 1986.

Four-banded Sandgrouse *Pterocles quadricinctus*

The sandgrouse of the Old World are a group of still-dubious evolutionary affinities, but most often have been taxonomically placed close to the typical shorebirds. They also have some curious similarities to the pigeons and doves, but this would seem to be a fortuitous similarity. Like shorebirds they have cryptically colored, highly precocial chicks, and they likewise have pointed wings allowing for extremely rapid flight. Most interestingly, they are highly adapted to living in extremely dry environments, often breeding in the most extreme of African deserts and often flying many miles daily for sipping water or cooling their body. Several species are known to wade into water deep enough so that it will cling to the especially modified inner breast feathers by capillary action. The birds then fly back to their nests and either spread water over their eggs to cool them, or allow their chicks to drink from the water trapped within their feathers.

The four-banded sandgrouse is named for the series of light brown, chestnut, white and black colors that cross the male's breast. It is widespread across the Sahel region immediately south of the Sahara, and extends north locally to the Ethiopian coast. Like all sandgrouse it is about the size of a pigeon, and the sexes are very similar in size, but the female is more concealingly patterned. The birds are extremely gregarious, and flocks gather daily at watering holes. They often forage from dusk until well into the night, feeding on weed seeds and other readily available seeds. Probably at least some of their water is metabolically manufactured from such sources.

These birds are monogamous, producing clutches of two or three eggs that are highly cryptic in pattern. Breeding in Ethiopia mainly occurs from February to March, and incubation lasts about 21 days. The newly hatched young are perhaps even more cryptic than the eggs, and greatly resemble those of some tundra-nesting sandpipers or plovers.

Suggested reading: del Hoyo, Elliott & Sargatal, 1997; Johnsgard, 1991; Urban, Fry & Keith, 1986.

Bruce's Green Pigeon *Treron waalia*

This rather colorful pigeon was first collected near Lake Tana in 1793, and its odd species' epithet reflects the name applied to it by the local Abyssinian tribe. It is mostly confined to the sub-Saharan Sahel zone, but reaches the coasts of both Ethiopia and Somalia, as well as occurring on Socotra Island in the western Indian Ocean. Both sexes are predominantly grayish green above and bright yellow below, but the strange mauve-colored patch on the forewing of females smaller than in males. This odd, if not bizarre, color combination would seem unlikely for any bird, but nevertheless makes for an attractive appearance. Fuertes called the bird a "fig pigeon," and indeed the species is a fig specialist. It is mostly to be found where fig trees also occur, and so often can be seen in towns and villages. Because of its leaf-green color, it becomes almost invisible when perched; like many parrots the yellow underparts seem to provide a more concealing hue through countershading than would white.

Green pigeons are part of a large, tropical group of Old World pigeons called fruit pigeons. They tend to be larger than most seed-eating pigeons, and often exhibit strange color combinations that appear conspicuous among zoo-dwelling birds, but are highly effective for concealment in the wild. The chemical basis for producing these colors needs additional study; presumably the yellows are produced by carotenoids, but the greens and mauves are more problematic. Probably it was these unusual plumage colors that stimulated Fuertes to paint this bird; nearly all of his other watercolors depict species with colorful or unusual soft-parts, such as bare head skin.

Like other pigeons, this birds are monogamous and build flimsy platform-like nests in which one or two white eggs are laid. Breeding records from adjacent areas of Somalia are from March to June. Both sexes tend the nest and young, and feed the young squabs on regurgitated "pigeon milk". Incubation and fledging each require about 14 days.

Suggested reading: del Hoyo, Elliott & Sargatal, 1997; Goodwin, 1970; Urban, Fry & Keith, 1986:446.

Eastern Gray Plantain-eater *Crinifer zonurus*

The turacos and plantain-eaters are a large group of African species of perching birds found widely in trees and woodlands south of the Sahara desert. Their relationships are uncertain at best; they have been variously allied with cuckoos, owls and nightjars, none of these suggested affinities are very convincing. Their toe arrangement is peculiar; the outermost toe points neither forward nor backward, but rather usually sticks out at right angles from the foot axis. At times it can be reversed, and at other times may be brought forward, depending on perching needs. These birds usually remain well hidden in trees; although I often heard turacos calling, especially during evening hours when they joined in a wild chorus with bushbabies and hyraxes, I rarely saw them. Some of the species are called “go-away birds” because of their raucous and constantly repeated “g-way” calls. These calls are apparently used in territorial advertisement, and are frequently uttered in asynchronous duets. The English name turaco (and the genus *Tauraco*) are reportedly derived from a combination of two French words, but originally probably came from a West African native name. Some turacos are called louries, especially in southern Africa.

This species is essentially blackish gray and white in its plumage. Such plain plumage colors seem to be adapted to the open, relatively arid habitats of these birds. It also has a bushy gray crest in both sexes---its generic name means “hair-bearing.” These crest feathers are rather bristly instead of being soft to the touch, and are permanently raised. In spite of the vernacular name “plantain-eater,” bananas and other plantains are never eaten. It mainly consumes figs, the fruit of the parasol-tree (*Musanga*), and other fruits. Thus the birds are important in dispersal agents for the seeds of such trees.

Plantain-eaters are highly territorial, and construct rather flimsy nests in thick foliage, especially acacias. Their usual clutch is of two or three eggs, incubated by both parents. Incubation may take about 20–25 days, and fledging probably about a month.

Suggested reading: Chapin, 1939, 1963; Cooper & Forshaw, 1988; del Hoyo, Elliott & Sargatal, 1997; Fry, Keith & Urban, 1988; Moreau, 1938.

White-cheeked Turaco *Tauraco leucotis donaldsoni* (2 plates)

Turacos are a strictly African group of some 23 species of mostly medium-sized birds with fairly short and rounded wings, long tails, and bushy crests. Like cuckoos, their toes are arranged with two in front and two behind, but there is little reason other than that common trait to associate the two groups. If the two groups are related, they have probably been separated for about 100 million years, and thus warrant ordinal separation. Most of the 23 or so species belong to the group called "typical turacos," a group that includes the present species. Many of these are predominately leaf-green, with bright red and feather pigments. These are fairly noisy birds, uttering raucous notes that probably relate to territorial advertisement or defense. The plantain-eaters, such as the previously described species, comprise five additional and less colorful species.

Nearly all members of the turaco family, even the all-gray ones, have at least some traces of a uniquely green feather pigment (turacoverdin) a copper-based pigment of the porphyrin type. A closely related blood-red pigment is turacin, which often occurs on the inner flight feathers of turacos. Although this pigment is water-soluble, it does not simply "wash out" of wet feathers, as sometimes believed. However, immersing such feathers in a weak alkaline solution soon bleaches the red areas to the color of faded blood, proving their chemical sensitivity. Each year in my ornithology class I have removed one red flight feather from a discarded turaco skin to demonstrate this, and decided long ago that when I have run out of these 30 or so interesting feathers it will be a signal to retire!

The white-cheeked turaco is a member of the typical turacos; it is mostly grass-green to bluish green, with a bushy crest, a long tail, a red bill and eye-ring, and, like all its near relatives, crimson flight feathers. Two racial variants (or very closely related species) of this form occur in Ethiopia; the race *donaldsoni* (called the "Donaldson's turaco" by Fuertes) has some crimson present in the crest. Another similar form (*ruspoli*) in southern Ethiopia lacks the white patch on the sides of the head and neck, and is considered a separate species. The species name *leucotis* refers to the distinctive white facial stripe of adults. The white-cheeked turaco is almost entirely confined to Ethiopia, and occurs in riverine forests, montane forest up to about 10,000 feet elevation and bushlands. It is especially fond of the fruits of junipers and *Podocarpus* trees, but at least in captivity will also eat insect larvae. The sexes are alike in size and appearance, except that the female has a duller bill during breeding. The more finished of the two paintings done by Fuertes was clearly painted after his return, and is similar to one in Cornell's Laboratory of Ornithology that was painted only a few weeks before his death (Chapin, 1963).

Like most turacos, this is a noisy species, uttering a variety of cackling calls, especially during the long breeding season from about June to November or December. The birds form monogamous pairs, which are well dispersed and probably are territorial. They build twig nests of variable size, but usually shallow platforms, in dense foliage.

The breeding biology of most turacos is rather poorly studied, but during courtship the crimson-winged species of turacos perform wing-spreading displays, and many turacos also perform crest-raising, tail-flicking, and exposure of their distinctive head markings. Mutual feeding also occurs, as well as a good deal of chasing from tree to tree. In one of the plantain-eaters tumbling dives by the male toward his perched mate are a part of the courtship rituals.

Little is known of the white-cheeked turaco's breeding biology in the wild. Breeding is evidently spread out over much of the year, in both wet and dry seasons. The species has nested successfully in captivity. In one case the male built a sausage-shaped platform nest, and in another

the female built a more fragile nest. One captive pair attempted to nest five times in as many months, and another pair produced seven young in seven months, during four nesting efforts.

Suggested reading: Borghesio, 1997; Chapin, 1963; Cooper & Forshaw, 1998; Everitt, 1965; Fry, Keith & Urban, 1988; del Hoyo, Elliott & Sargatal, 1997; Foxall & Burton, 1975; Moreau, 1938.

White-browed Coucal *Centropus s. superciliosus*

This is the only African cuckoo illustrated by Fuertes, and it is one of the non-parasitic forms of very large cuckoos. Its genus consists of nearly 30 species of birds that occur throughout the Old World tropics. They are all large, semi-terrestrial birds with greatly elongated tails but rather short wings. Like all cuckoos their toes are arranged two in front, two behind, as in woodpeckers, and virtually all cuckoos have loud or distinctive voices, which in *Centropus* species are low-pitched and rather pigeon-like. Calling duets are common in these birds and, like some others, this species has a "water-bottle" vocalization that sounds very much like water being poured out of a narrow-necked jug.

As its common and specific names suggest, these birds have contrasting white eye-stripes through their otherwise grayish heads. Their wings are bright rufous, and their blackish tails seem too long for their bodies. The adult sexes are alike in size and plumage, but immatures are tawnier on their head and breast. The birds reach the northern limit of their range in Ethiopia, where they extend into relatively arid habitats. More generally they are found in fairly moist savannas. They generally prefer to hide, walk or run than to fly, which seems to be done with some difficulty. They have even been known to swim, but this must be quite rare. Such swimming ability as well as their general proportions reminds one of the strange South American hoatzin (*Opisthocomus*) of the Orinoco River basin, a bird often distantly affiliated taxonomically with cuckoos.

Coucals forage rather omnivorously on arthropods, crustaceans, and , small vertebrates such as amphibians, lizards, snakes and the eggs or chicks of various birds. They evidently pair monogamously, and exhibit no sign of the brood-parasitic tendencies of typical cuckoos. Presumably in this regard at least the coucals exhibit relatively primitive breeding adaptations. Apparently the male does most of the incubation, and multiple broods per season are common. Probably incubation and fledging each require about 18–20 days.

Suggested reading: Chapin, 1939; del Hoyo, Elliott & Sargatal, 1997; Fry, Keith & Urban, 1988.

Narina Trogon *Apaloderma n. narina*

There are only three trogon species in Africa, and this is the most widely distributed of them. The great majority of trogons occur in the New World tropics, and the quetzals (*Pharomachrus*) are much the most famous of these. The Narina trogon was apparently named in 1815 after a young South African black woman about whom almost nothing is known. It ranges from South Africa north to coastal Ethiopia, as well as to coastal West Africa, in savannas, rainforests and montane forest habitats. Both sexes are brilliantly iridescent green above and crimson red below, the red color deriving from carotinoid pigments. Such pigments are normally obtained by red- to yellow-colored birds through the ingestion of fruits and berries, but the African trogons are reputed to be entirely dependent on animal foods, especially insects. All trogons feed in a similar manner. They sit quietly on a branch for long periods, scanning the area around them for insects that may be crawling on or hiding among leafy vegetation, or in flight. Sighting an opportunity they swoop down, and then stall out as they hover and snatch their prey in mid-air. They then return to their perch to subdue and consume their bounty.

The Narina trogon is much like most trogons in that it is far more easily heard than seen. I have stood directly beneath a pair of periodically calling trogons for several before locating them. The birds seem to maddeningly and purposefully keep their glossy but inconspicuous green backs turned toward the observer, rather than their brilliant red underparts. Pair bonds are apparently long-term among many trogons, but in at least some species the start of the breeding season is marked by the male locating one or more potential nest sites (often abandoned woodpecker cavities) and advertising both the nest's location and his presence by frequent, repetitive calling. These notes are often long series of wooden notes something like those of cuckoos. The incubation period is about 16 days, performed by the female, and the fledging period about 25 days.

Suggested reading: Chapin, 1939; Fry, Keith & Urban, 1988; Johnsgard, 2000.

Gray-headed Kingfisher *Halcyon l. leucocephala*

Kingfishers are wonderfully named, with regard to both their scientific and vernacular names. Few birds are better fishers than are kingfishers, and the generic name of this species calls to mind the gentle halcyon days of late fall. Alcyon was the daughter of Aeolus, the wind-god, and her fisherman husband's name was named Ceyx. After finding him dead on the seashore following a shipwreck, Alcyon threw herself into the sea. On seeing this proof of love, the gods rewarded the pair by transforming them into kingfishers. These kingfishers laid their eggs near the start of winter, and set them afloat on a nest of hollow fish bones. In order to protect their eggs from destruction, the wind-god Aeolus calmed the seas at this time, thus causing the peaceful pre-winter period of halcyon days.

The gray-headed kingfisher is the largest of the three species painted by Fuertes, but it is still only of medium size in terms of the entire kingfisher group. Like many kingfishers it is sky-blue on the upper surface of the wings and tail, and has a gradually tapering scarlet-red bill. Additionally, it has a contrasting gray head, black upperparts and a chestnut belly. It is part of a large species assemblage called woodland kingfishers that feed mainly on the ground rather than from water, and on a variety of invertebrates and small vertebrates. Prey as large as small mice, lizards, and nestling birds that have fallen to the ground are taken. Hunting is done in much the same manner as by trogons; a period of patient waiting and watching, followed by a quick swoop down to catch the prey, and then a rapid return to the same or a different perch to subdue and eat it.

Gray-headed kingfishers are rather solitary, highly territorial birds that announce their presence with display-singing and vibrating their opened wings while perching, thus exposing the brilliant color patterns effectively. Pair-bonds are monogamous and probably long-term, and nesting (May to June in Somalia) is done in self-excavated ground tunnels.

Suggested reading: Forshaw & Cooper, 1983, Fry, Keith & Urban, 1988; Grzimek, 1973.

Pygmy Kingfisher *Ceyx p. picta*

Pygmy kingfishers are one of Africa's smallest kingfishers, with adults averaging only about a half-ounce. They are jewel-like sprites of the evergreen forests and gallery forests through much of sub-Saharan Africa except for the southern tip. They resemble the even smaller dwarf kingfisher (*C. lecontei*), but have an all-dark blue crown, with slightly lighter blue barring. This same crown pattern separates them from the somewhat larger malachite kingfisher, whose crown is more clearly barred and elongated into a crest and which lacks an orange eyebrow-like stripe below. Both have stiletto-sharp crimson beaks about as long as their heads, and both catch a variety of insects and other arthropods from land as well as occasionally from shallow water or by aerial chases.

In spite of their brilliant coloration, these tiny birds are quite inconspicuous when perched quietly and almost motionless among vegetation, awaiting their chances at any food items that may chance to pass by. Their calls are high-pitched, weak, and mainly uttered while in flight. The birds are found singly or in pairs, and like other kingfishers appear to be strongly territorial. They may occupy the same perches and use favorite hunting sites for extended periods. The sexes are identical in plumage, but immatures are paler throughout. They remain with their parents only a short time before dispersing and establishing their own hunting areas.

Pairs excavate nests in vertical slopes of steam-banks, road-cuts, or similar site, the tunnels usually being less than a yard in depth. Often the tunnel initially slopes slightly upward, then descends into a larger egg chamber. Like other kingfishers the eggs are white and rather rounded; the clutch averages about three or four eggs. Both sexes incubate through the 16-day period to hatching, and both feed the chicks. The fledging period is still unreported, but in some relatives requires about 25 days, so is probably similar.

Suggested reading: Chapin, 1939; Clancey, 1992; Forshaw & Cooper, 1983; Fry & Fry, 1992; Fry, Keith & Urban, 1988; Grzimek, 1973; Newman, 1971.

Malachite Kingfisher *Corythornis c. cristata*

Just as beautiful as the pygmy kingfisher, the malachite kingfisher is only slightly heavier. Fuertes' elegant study, one of his best, shows the forehead feathers raised in a vertical crest, but when the bird is at rest they lie flat, along with the other crown feathers. Yet they are sometimes erected and spread laterally as the bird is peering down from a hunting perch, perhaps to help shade the eyes when hunting from a sunny location. These birds are more closely associated with water than is the pygmy kingfisher; perhaps they thus avoid direct competition in areas where they co-occur. As a result their foods consist mostly of small fish, crustaceans, amphibians, and water-loving insects such as dragonflies, damselflies and the like.

In the usual kingfisher manner, these birds are strongly territorial, and a pair may defend as much as two hundred yards of shoreline. Most prey items are captured by a sudden near-vertical dive into the water, catching prey very near its surface. The item is then carried back to a nearby perch where it can be killed and swallowed head-first. Fish up to about two inches in length can thus be handled. Probably non-breeding birds eat up to 20 such prey per day, but when feeding a large brood of nestlings the number taken may easily exceed 60.

It is likely that sexual maturity comes by the end of the first year, but such birds may breed in a plumage that is still not fully adult. Courtship consists of extended chases of the female by the male over water, the presentation of food items, and mutual crest-raising. The nest tunnel is typically excavated in a clay bank near water, and is normally less than a yard long. There are usually from four to six eggs in a full clutch, and it is likely but unproved that both sexes help incubate. Both the incubation and fledging periods are still unreported, but those of near relatives been estimated to be about 16–17 and 25–28 days.

Suggested reading: Chapin, 1939; Clancey, 1992; Forshaw & Cooper, 1983; Fry & Fry, 1992; Fry, Keith & Urban, 1988; Grzimek, 1973; Newman, 1971.

European Hoopoe *Upupa e. epops*

This widespread European and African species is notable for the fact that its English vernacular name (based on its call) as well as both its generic (the Latin counterpart) and specific names (the Greek equivalent) are all variants of the same descriptive origin. Probably part of its attraction lies in the fact that, when depressed, its long crest is about the same length and shape as the bird's bill. The early Egyptians considered the hoopoe of symbolic significance, since they believed that old individuals bring their younger kin food when they are helpless and molting into a new plumage. The Arabs considered the hoopoe to have medicinal or magical properties, and used its body parts in amulets. Hoopoes rather resemble giant butterflies or moths in flight, when their black-and-white wing patterning is most apparent.

There are several races of hoopoes occurring in Africa, including both residential populations and the migratory European race, which latter is depicted in Fuertes' plate. These birds winter just south of the Sahara from Senegambia in western Africa to Ethiopia in the east. All races of hoopoes are quite similar in appearance and all are highly distinctive in appearance. The male's "hoo-poe" note is its advertisement call, and is most frequently uttered shortly in advance of the breeding season, which in Somalia is from April to June.

Hoopoes are mainly insectivorous, foraging on the ground surface, in the litter layer, and probing in soft soil with the bill. The species is very tolerant of warm, sunny conditions, and seemingly never drinks water. On seeing an overhead predator, it flattens out, spreads its highly patterned wings and tail, and points its bill upward, rather than trying to make itself as inconspicuous as possible. The birds are highly vocal, producing a wide range of calls, including a snake-like hissing sound when disturbed on the nest. Nesting occurs in cavities, with the incubation and fledging periods 18 and 25 days.

Suggested reading: Chapin, 1939; Cramp & Simmons, 1985; Fry, Keith & Urban, 1988; Grzimek, 1973; Newman, 1971; Skead, 1950.

Abyssinian Ground Hornbill *Bucorvus abyssinicus*

On seeing one's first ground hornbill is hard to decide whether to gasp in surprise or laugh. Somehow the birds fail to fit the standard vision of a hornbill; their turkey-sized mass, long-legged profile, and an almost entirely black appearance would seem to fit a Walt Disney movie better than the African savanna. Further, their vividly colored bare facial skin, an inflated bill casque, and a sleepy-eyed look accentuated by improbably long eyelashes add to the comic-tragic effect. They walk slowly and funereally about on tip-toes, often in pairs or trios, like unemployed actors all applying for the same role as a mortician.

There are two species of ground hornbills; this one extends across sub-Saharan Africa from Mauritania to Ethiopia, mostly in savanna and dry grasslands. The other one is more southerly in range, and has more blue and less red in its facial skin. Unlike all other hornbills, of which there are 23 African species, the ground hornbills are mostly carnivorous, foraging on a variety of small vertebrates as well as insects. At times this species will be attracted to carrion, heightening the mortician image, but also will occasionally eat plant materials such as fruits and seeds.

Ground hornbills only rarely fly, but in flight they reveal contrasting white primary feathers. They also sometimes utter deep, booming notes something like those of a kori bustard, but in more rapid sequence. Males often produce such booming calls during courtship, as they walk around the smaller females. Other courtship displays include mutual beak-slipping, nest-site inspection and courtship feeding. Like all hornbills they are monogamous, but unlike all other hornbills the nest entrance is not sealed up, and no nest sanitation is performed. Although a tree hollow is often chosen for a nest site, the birds may also use hollow logs, other natural holes, or self-excavated cavities in earthen banks. Incubation and fledging require 118–131 days, including an 80–90-day fledging period. Probably at least four years are required for maturity.

Suggested reading: Chapin, 1939; Forshaw & Cooper, 1995; Fry, Keith & Urban, 1988; Grzimek, 1973; Kemp, 1995.

Red-billed Hornbill *Tockus erythrorhynchus*

This species was incorrectly identified as Hemprich's hornbill (*Tockus hemprichii*) on Fuertes' plate. This latter species is generally darker throughout, with outer tail feathers that are progressively white outwardly. Both species have red to orange-red bills, with no indication of a casque. The red-billed hornbill is much more widespread and common within its broad range, which includes nearly all of Ethiopia. Fuertes' plate shows an adult male; females have shorter bills and almost no black on the lower mandible. The birds are mostly found in open savanna, scrub woodland, or thorny scrub, especially where acacia trees are abundant. They ascend as high as about 7,000 feet (2,100 meters) in Ethiopia. They are also common in Kenya and northern Tanzania, where I have seen them in various locations. In all these areas they co-occur with the yellow-billed hornbill (*Tockus flavirostris*), which is somewhat larger, has a more yellowish bill, and a more distinctly banded tail. Red-billed hornbills are mostly ground-foragers, catching a variety of insects, especially dung beetles, but also many other terrestrial invertebrates. It sometimes also catches and eats geckos, the eggs and chicks of weaver-birds, and sometimes scavenges the carcasses of small mammals.

These birds are monogamous and territorial, with pairs scattered at densities of about 250 acres per pair, and their nests located an average of about 200 yards apart. Mated pairs call and display together, the birds uttering a series of accelerated clucks, simultaneously bobbing the body up and down. Males also courtship-feed their mates. Nests are located in the natural cavities of trees, or sometimes in old woodpecker or barbet holes. Any cracks or extra entrances are sealed over, and the female herself does all the final closure, until only a small slit remains. The male brings her daubs of mud for closing the cracks; some droppings and insects may also be incorporated into the mix. Males also bring in green materials for a nest-lining, and feeds her during her incarceration.

Suggested reading: Forshaw & Cooper, 1995; Fry, Keith & Urban, 1988; Kemp, 1995; Ginn, McIlleron & Milstein, 1989; Newman, 1971; Root & Root, 1969.

Silvery-cheeked Hornbill *Ceratogymna brevis* (plates)

The silvery-cheeked hornbill is part of a group of seven hornbills that are endemic to Africa, and all are fairly large, arboreal and mostly fruit-eating birds. This species is notable for its large bill casque and the silvery streaking on the sides of its face. Males are both larger in overall size and in their degree of bill enlargement than are females. Adults of both sexes have bright blue eye-rings and a yellow band around the base of their otherwise mostly brownish bill. Young birds lack this yellow band, have more brownish faces and the casque is only slightly developed. The generic name means "naked bill," with the specific *brevis* element meaning "short." Their plumage is mostly black, except for a white rump and lower underparts, and white markings at the tips of their outer tail feathers. Their outer primaries are distinctly narrowed toward their tips, which may be why the wings produce an audible whoosh-like sound in flight.

These birds are present throughout the Ethiopian highlands, up to about 8,000 feet elevation, in montane and riparian forests and woodlands. Although usually found in pairs or family groups, they become quite social where food is abundant, such as at fruiting trees. They also may roost colonially, in flocks of as many as a few hundred individuals. During daylight hours these roosting groups break up as the birds disperse to foraging. They are not only frugivorous, but sometimes attack small prey, such as insects, bird eggs or nestlings, or small mammals. Prey as large as fruit pigeons, and fruit bats may be attacked and consumed.

Like most hornbills, adults are highly vocal, and various loud growls, barks and braying sounds are uttered. Presumably at least some of these notes serve for courtship and sexual advertisement, since definite territoriality seems to be absent. Breeding in Ethiopia extends from February to July, centering on the rainy season. Males court females through courtship-feeding, mutual preening and probably other postural displays, but these are still undescribed. Nest site selection must begin months in advance of actual egg-laying, as the birds begin to seal up the entrance to a tree cavity or sometimes a hole in a rock. Sealing is achieved by the male bringing soil pellets to the female, who then takes these saliva-moistened pellets and applies them to the edge of the cavity entrance. Such activities continue until the entrance is so small the female can barely enter and leave. Finally she enters it a final time, and the entrance is further sealed until only a narrow slit remains through which the male can pass his bill and deliver food. Two eggs are laid and incubated for about 40 days. During that time the male may deliver food, mostly small fruits, to the nest up to 14 times per day.

Following hatching the male increases his visits to as many as 24 times a day, perhaps visiting the nest as many as 16,000 times throughout the entire nesting cycle. Fledging is attained after nearly 80 days of nestling life. During this long period the male will also deliver bark flakes and bark lining to the nest, probably to aid in nest sanitation. At this time the nest seal is broken and the female and their offspring emerge. Apparently the usual result is a single surviving chick, although two may occasionally be reared successfully. After the female's emergence she undergoes a wing and tail molt. Overall, pairs produce an average of about 0.4 to 0.6 fledged young per breeding attempt. In spite of this rather low success rate, the nest-sealing behavior of hornbills must certainly reduce the overall degree of nest predation by predators.

Hornbills are notable for being the only group of birds in the world in which the female is incarcerated within the nesting cavity throughout the entire incubation and rearing period. The origin of this remarkable behavior is speculative, but probably reduces predation probabilities. It is interesting that the sealing behavior is generally done by the female alone, with the male's role reduced to ferrying in materials to the female, who applies them to the edges of the opening until

only a small aperture remains, large enough to allow for food transfer. Similarly the hornbills, if not entirely unique in their bill casques, have elaborated this trend to a remarkable degree, and collectively offer an extraordinarily large range of casque shapes and colors. This is especially notable in view of the monogamous pairing behavior in the entire group, which greatly reduces the potential impact of sexual selection.

Suggested reading: Forshaw & Cooper, 1995. Fry, Keith & Urban, 1988; Grzimek, 1973; Kemp, 1995; Moreau & Moreau. 1941.

Double-toothed Barbet *Lybius bidentatus aequatorialis*

The barbets are a group of small to medium-sized birds that are related to woodpeckers, and share the “yoke-toed” foot arrangement of that group, a climbing adaptations in which with two toes face toward the front and two are behind. Some species even peck at wood like woodpeckers, or drum on the surface of trees for social signaling. Like woodpeckers, they not only nest but also roost in holes. These sites usually are tree cavities, but sometimes nesting occurs in holes made in termite mounds or even in the ground. Largely insectivorous, fruits are also eaten by some barbets. The majority of the species occur in Africa, and all are limited to the Old World.

The double-toothed barbet is so-named for the two tooth-like projections on each side of its upper mandible. It is a rather large barbet, with black upperparts, mostly bright red underparts, and a bright yellow eye-ring and a pale yellowish white bill. There are also patches of white on the back and sides. The sexes are nearly alike as adults, but females show an array of small black spots on their red flanks. They occupy forest edges, savannas and parklands, and often glean for insects along tree surfaces. In Ethiopia they extend up to almost 6,000 feet.

Barbets are not especially musical, but this species does produce a variety of calls and utterances that evidently function as songs. The birds are social, their small flocks probably representing family units that roost together. The birds are monogamous, and pairs maintain fairly large territories that typically include some fruiting trees such as figs.

Forming monogamous pairs, the birds excavate cavities in trees or snags, where for much of the year the pair roosts together. Courtship activities include tail-cocking and tail-swinging movements, wing-flicking, mutual preening, and erection of the white patches of feathers along the flanks. Breeding in Ethiopia probably occurs between August and November. As many as four white eggs are laid, and incubation is by both sexes. Incubation requires about 13 days. Helpers may appear to assist with chick-rearing; these presumably are young of the previous year.

Suggested reading: Fry, Keith & Urban, 1988; Grzimek, 1973; Marshall & Marshall, 1998.

Brown-throated Wattle-eye *Platysteira cyanea aethiopica*

Wattle-eyes are a curious group of small African flycatchers that are almost entirely black above and white below, and with a vivid scarlet wattle above each eye. They are small birds, only about five inches long. They behave more like tits than flycatchers, gathering most of their food from searching about on leaf and twig surfaces, but at times catch insects in flight like the New World flycatchers. Their generic name translates as “broad-keeled,” and refers to the broad and flattened bills of these birds. There are three species of wattle-eyes; these in turn are close relatives of the puff-back flycatchers (*Batis*) of southern Africa. Wattle-eyes perform a similar rump-fluffing display similar to those of puff-backs, but lack the specialized rump feathers of the latter group, which when erected resemble small powder-puffs.

Adults of this species of wattle-eyes are distinctive in having white wing-bars in both sexes, and females have a dark chestnut chest rather than the black throat and chest of males. The birds usually forage through the juniper and *Podocarpus* forests in pairs, family groups, or mixed-species flocks. Their vocalizations include harsh notes and rattles, and both sexes duet simultaneously with descending clear whistles that seem to serve as territorial songs. Males also make churring, wing-flapping and bill-snapping sounds, and courtship-feed females.

During the breeding season, centered in the wetter months, the birds form monogamous pairs and construct inconspicuous cup-like nests of grasses, plant fibers and lichens, often placed low in tree forks. Females lay only two eggs and do all the incubation, but the males brings food to their mates. The incubation and fledgling periods are 17 and about 14 days respectively, and the young may be fed by their parents for up to 80 days after fledging.

Suggested reading: Brosset & Erard, 1986; Campbell & Lack, 1985; Chapin, 1953; Ginn, McIlleron & Milstein, 1989; Grzimek, 1973; Urban, Fry, & Keith, 1997.

White Helmet-shrike *Prionops plumatus concinnata*

The helmet-shrikes of Africa are so-named for the projecting forehead feathers of some species, especially the present one. Several also have yellow wattles around their pale-colored eyes, producing a rather "bug-eyed" appearance. Indeed, the generic name of the helmet-shrikes means "saw-eyed." They are otherwise typical shrikes, with heavy, hooked bills, large heads, and a generally black-and-white plumage pattern. The sexes are identical as adults; younger birds have a greenish wattle and brown eyes.

Helmet shrikes are gregarious, moving about in small flocks, usually feeding near the tops of trees, and making frequent chattering and bill-snapping sounds. They are quite fearless, and in some parts of equatorial Africa are called "leopard-birds," because of their tendency to mob leopards. They also respond to human hunters by making threatening calls and mobbing behavior, if not actual attacks. They most often occur in open woodland, and are generally found at lower elevations.

Helmet-shrikes forage on a variety of insects and probably some small vertebrates. Curiously, they seem to be non-territorial, as even during the breeding season they occur in small groups, these probably consisting of closely related birds. Nests are constructed on lateral branches or at the crotches of trees, and are fairly close to the ground. They are inconspicuous and compact, lined with shredded bark, rootlets and grass inside, and covered externally with cobwebs. At least in a closely related species several nests may be located fairly close together, and in this species as many as four birds have been seen building a single nest. Nests or young have been reported in March, May and October in Ethiopia and Somalia . There are usually four eggs, and the incubation period is about 12–14 days. Following hatching it is common for several individuals to participate in the feeding of the young, as well as in nest-defense. Fledging requires 16-20 days.

Suggested reading: Bannerman, 1939; Campbell & Lack, 1985; Chapin, 1954; Fry & Keith, 2000; Ginn, McIlheron & Milstein, 1989; Grzimek, 1973; Newman, 1971.

Thick-billed Raven *Corvus crassirostris*

The ravens of Africa include several species of large, crow-like birds, of which this has the most massive bill. It is the northern counterpart of the much more widespread white-necked raven (*C. albicollis*). However, the Ethiopian bird is larger and has an even more massive bill that enables it to crush heavy food items. Like all crows, these are alert and highly adaptable birds that often follow human camps, and rapidly locate any carrion or even well hidden foods. While doing fieldwork in the Teton mountains of Wyoming I sometimes made every effort to hide some meat scraps in order to attract and try photograph a pine marten, but in spite of my best efforts a common raven (*Corvus corax*) invariably found it first.

These birds occur at moderate elevations, and probably concentrate near human populations, where offal and food scraps are readily available. They also eat insects, especially beetle larvae excavated from dung, and may even clip the heads of standing wheat plants. A captive individual was observed dunking some dried food in water, and also cached excess food.

Like other ravens, nesting occurs on cliffsides or in trees, the latter locations chosen where rocky sites are not available. The birds nest during the drier period, from December to February; nestlings may be present at late as the latter part of March. Territorial fighting has been seen, and aerial aggressive or courtship displays are evidently present, as in other ravens. Mutual preening, especially of the white nape area, is probably also present. Details of nesting biology are still lacking, but in the closely related white-necked raven the usual clutch is of three to five eggs. In most raven species incubation lasts from about 18-20 days, and is performed only by the female, who is fed by her mate. However, both sexes brood and feed the young, which fledge in about six weeks. The young birds remain with their parents for some time thereafter, then join groups of immature or non-breeding birds.

Suggested reading: Fry & Keith, 2000; Ginn, McIlheron & Milstein, 1989; Goodwin, 1976; Grzimek, 1973; Willmore, 1977.

Cape Rook *Corvus capensis kordofanensis*

The Cape rook is named for the Cape of Good Hope in South Africa; it is also often called the black crow. It is similar in size and appearance to our American crow (*C. brachyrhynchos*), but has a much more slender bill and a rather distinct "beard" that is often expanded to produce a large-headed effect. The birds are fairly common from Ethiopia southward through much of eastern and southern Africa, but there is a range gap in the plains of east-central Africa. They occur in savanna, woodland, or grasslands with scattered trees, and are especially common near agricultural areas, where they become pests. Besides eating a variety of arthropods and other invertebrates, they also favor cultivated grains, fruits and berries. They also probe in soft ground for insect larvae and plant bulbs, work through cattle dung for beetle larvae, and may steal the eggs of poultry.

Adult birds are monogamous and strongly territorial, each pair defending an area of about 150 acres. These boundaries are rigidly protected against conspecifics, and both roosting and nesting occur within their boundaries. Immature or unpaired birds lack territories, and forage as well as roost in flocks. They are highly vocal, and noted for the unusual ability for mimicry.

These birds nest near the tops of trees; breeding in Ethiopia and adjacent northern Somalia has been noted from April to June. Bill-touching, mutual preening, and courtship-feeding precede nesting. Aerial gliding displays, with the wings held in a arched position and with the primary feathers vibrating, are used in hostile situations.

The nest is a rather large, cylindrical structure, well lined with grasses and roots, and with dried dung incorporated into the layers of twigs. The clutch consists of three or four eggs, and it is probable that both sexes participate in incubation. After about 18-19 days the eggs hatch, and the young fledge at 38-40 days. The fledglings remain with their parents for a prolonged period, sometimes for several months after fledging.

Suggested reading: Fry & Keith, 2000; Goodwin, 1976; Grzimek, 1973; Skead, 1952; Willmore, 1977.

Guereza Colobus *Colobus guereza abyssinicus*(7 plates)

The colobus monkeys must be counted among the charismatic minifauna of Africa, along with the marvelous turacos, the bizarre bustards, the comical hyraxes, and dozens of other beautiful or compellingly interesting animals. I will never forget standing near the shoreline of Lake Naivasha in Kenya, on the property that once belonged to Joy Adamson. There I watched the colobus monkeys leaping through the trees, running wildly among the branches and clambering down to the ground to collect their daily handout of bananas and other fruit. Their jet black pelage, decorated with long flashes of white on the flanks, a white face and a tufted and white-tipped tail, is an artist's dream. Clearly, Fuertes was equally fascinated with the animals, repeatedly sketching them in repose and in full movement.

When leaping, the elbows and arms are held outward and forward, the tail is lifted, and the long white flank pelage lifts above the sides like a reverse white parachute. On landing the hands and feet are brought together, immediately ready for the next leap. The springing effect of the branches they land on may catapult them into the next jump, or the animals may even shake the branch into vertical motion to gain extra momentum. This must be a dangerous means of locomotion, and at times they reported may fall to the ground, usually with no ill effects. Even mothers carrying their small, all white, young, sometime engage in such seemingly dangerous activity. The little babies cling tightly to their mother's underparts, and are supported by one of the mother's hands.

The scientific and vernacular name *Colobus* means maimed or crippled, and comes from the Greek *colobe*. It refers to the rudimentary thumb on the front foot, which looks as it might have been amputated. However, the other fingers are very long, hook-like, and are well adapted to the grabbing of branches while in "flight." The corresponding digits on their hind feet are well developed and provide for excellent grasping abilities. Counting their long tail, adults are about five feet in length, and weigh from 14–32 pounds.

Because of their large size and spectacular pelages, colobus monkeys have long been hunted, both by natives such as the Masai for decorative capes, and foreigners for similar articles of apparel. Indeed the commercial trade in colobus skins is hundreds of years old, and several millions of animals have been made into skins for such purposes. As a result, populations have greatly declined over much of the range of colobus monkeys, and they are now most often seen in well-protected localities. In Ethiopia as many as 40,000 animals were killed annually for their skins, as recently as 1972 some 200,000 skins were available for sale. By the mid-1970's it was listed as a protected species, but several dealers still had trapping permits. A good deal of unlicensed hunting may also persist. Probably the best remaining populations are in the Simien Mountains and Awash National Park.

There are several species of colobus monkeys, which are mostly confined to tropical lowland areas. These populations differ considerably in the amount of white on the shoulders and flanks, and one species is fact entirely black. However, the type found in the Ethiopian and East African highlands has wonderfully long pelage, with white extending from the shoulders to the base of the tail. This long and thick fur coat no doubt is an adaptation to cold temperatures; the conspicuous color must additionally be a significant social signaling device. The contrasting pattern also must make the animals highly visible to predators, and it has been reported that a colobus may draw leafy branches around itself when trying to hide. Known predators of colobus monkeys include crowned eagles (*Stephanoetus coronatus*), which specializes in monkeys, and chimpanzees, although the latter do not occur in Ethiopia.

Red-billed Oxpecker *Buphagus e. erythrorhynchus*

Oxpeckers have mastered the art of commensal or mutualistic living with ungulates as have few other birds. It is rare to see any of the larger game mammals of Africa without also seeing oxpeckers riding on their backs or heads, and industriously pecking at their skin. There are two species of oxpeckers, the red-billed occurring in eastern Africa from Ethiopia south to South Africa, and the yellow-billed (*B. africanus*) more generally occurring to the west, from Senegal southward. There is little difference between them other than bill color, but the red-billed species has a yellow eye-ring that is lacking in the other. Both clamber about the bodies of their hosts, seeking out ticks and the larvae of bloodsucking flies. This would seem to be a desirable activity from the standpoint of the mammals, and many do tolerate if not invite it, but the birds may enlarge the wounds made by ticks, or even feed directly on the host's flesh exposed after removing the tick or larva. These specialized birds eat little else of consequence. One food-habits study revealed 2,291 ticks in the stomachs of 51 birds, or an average of about 45 per stomach. The Latin name of this oxpecker translates as "red-billed oxen-eater". This species was first described by T. M. Stanley, of Stanley and Livingstone fame, and was initially named incorrectly as a species of tanager. It is actually part of the starling family.

The birds are starling-like in that they nest in the hollows of trees, in rock crevices, stone walls, or under eaves. Breeding in Ethiopia and Somalia occurs from March to August or even into September, during the wetter season. Usually there are three eggs in the clutch, and up to three broods per season. The incubation and fledging periods are about 12 and 30 days respectively. Besides feeding on the host's ectoparasites, oxpeckers are notable for their alert response to danger; uttering churring calls as they take flight. To this end they probably also do useful service for their host mammals.

Suggested reading: Attwell, 1966; Chapin, 1954; Fry & Keith, 2000; Grzimek, 1990; Moreau, 1933. Mundy, 1997; Newman, 1971; Stutterheim, 1982; Yalden, Largen, & Kock, 1976–86.

Colobus monkeys are essentially foliage eaters, living mostly on tree leaves, especially those of legumes. As noted earlier they are also fond of fruits (especially green, unripe fruits) and flowers when such items become available. Soil may also be eaten to obtain inorganic nutrients. Unlike the common, widespread, and more omnivorous *Cercopithecus* monkeys, colobus monkeys lack cheek pouches, but in common with the leaf-eating langurs of Asia have complex, chambered stomachs. This rumen-like stomach structure allows for the bacterial fermentation of cellulose. Their stomach complexity is also probably related to the fact that many of the leaves they consume are well endowed with chemical components that protect them against most herbivores. They additionally have enlarged large intestines, which is also related to their cellulose-rich foods. Their other conspicuous feature, the long tail, is not prehensile but rather is used like an acrobat's balance while in flight. Colobus monkeys also have conspicuous callosities on their rumps, used as pads when resting upright.

The social groups consist of one or more males (one of which is dominant), and varying numbers of females plus their offspring. In two studies of Ethiopian river forest sites, average troop size ranged from 9–15, with (in one case) 2.3 adult males, and six adult females. In most studies of this species a single male has led the troops. These troops typically live in small, permanent territories or home ranges. A group studied on Mt. Kilimanjaro had a home range of about 37 acres, but most of their time was spent within an area of only about ten acres. Such a home range might support 25–30 monkeys, but in well protected areas the density may be much greater than this. Studies in Ethiopia's Bole Valley and around Lake Shala resulted in estimated densities of 138 and 315 individuals per square kilometer (357 and 816 per square mile), one of the highest densities ever reported for any colobus monkey.

During much of the daylight hours these monkeys forage in tree-tops, but during afternoon hours they are likely to loll about, grooming one another or napping. They also enjoy sun-bathing, especially in early morning hours when temperatures are still low. This generally "lazy" pattern of activity, and their fairly small home ranges, are probably related to the readily available but low-energy foods that they consume. Much of their foraging occurs at lower and middle canopy levels, while resting and traveling occurs in the middle and upper levels.

Like many primates, colobus monkeys are notable for their loud calls. The call of adult males is a resonating, low-frequency call that might be described as a roar. In guereza this individual notes are widely spaced and very low in pitch. Roaring is especially frequent near dawn, at night, and when a potential predator is detected. It appears to facilitate spacing of troops, but is not specifically a territorial challenge. Thus, calling by one troop is likely to simulate a response by others within earshot, followed by a gradual reduction in noise level as the animals prepare to move to feeding areas. Once there they may call again, often bouncing on the branches or leaping from branch to branch, especially when other troops are in sight. These displays seem to keep troops from intermixing during foraging at commonly used feeding sites. Roaring is again used commonly near sunset, and may also be employed to try intimidate predators. Only fully adult males roar, and when more than one is present in a troop they roar simultaneously.

Although there are variations among other colobus species, this one seems to be characterized by having matrilineal social organization (females living with related females, rather than joining troops with unrelated ones), with troop[s] usually having a single male present. Females have frequent grooming interactions with other females, and allow other females to serve as "infant-handlers." These caretakers probably themselves learn how to handle infants properly, and the infant may become better integrated into the troop. Furthermore, should the mother die prematurely, it may be more likely that others will adopt the infant within the troop. It has been suggested that the conspicuous (white) coat color of infants is related to facilitating such infant-handling, as it is lacking in colobus species that don't engage in such behavior.

In contrast to baboons and various other monkeys, the black-and-white colobus species do not exhibit visible genital swelling during estrus. Seasonality of breeding varies in different regions, with births in some areas concentrated during the dry season, and in others spread throughout the year. Females are probably fully mature by four years of age, and males by six; some estimates suggest an earlier period to maturity.

Females in estrus actively solicit matings from the dominant male or other adult males in the group, which is perhaps related to the fact that visible sexual swelling is lacking during estrus. She presents herself to the male with her tail held high above her back, and the pair may then associate for a few hours, but not for prolonged periods. Males often groom the female before copulation, and chewing-like movements of both parties may also precede mating. Curiously, adult females regularly urinate on their tails, which tends to discolor them, but perhaps provides some social signaling value. Pregnancy lasts 147–175 days, and a single offspring is produced, weighing about a pound at birth.

Pregnant females become reclusive just before giving birth, and may be accompanied by a male, perhaps for protective reasons. The day after giving birth the female returns to her troop, and within a few weeks she may be sharing its care with other female troop members. This active interest in young babies by other females diminishes as the infant loses its white pelage at three or four months. Weaning occurs at about two months. The average interbirth interval is about 20 months.

Although juvenile females remain in their troop after they mature, adolescent males either voluntarily leave or are expelled as they approach adulthood. For a time they may become solitary, or perhaps may join groups of other young males. Eventually when fully mature they may manage to enter a new troop and challenge its leader for dominance. In such cases, at least among langurs, killing of newborns by the newly dominant male is fairly common, but such infanticide among colobus monkeys is not well documented. At least in captivity individuals are known to have survived for 20–30 years. Clearly this is a case of remarkable longevity, and mortality in the wild must be substantial, especially in young animals, which are probably relatively susceptible to falls as well as predation.

Suggested Reading: Davies & Oates, 1994; Dunbar, 1987; Dunbar & Dunbar, 1974b; Grzimek, 1990; Kingdom, 1971–1982; 1997; Marler, 1972; Nowak, 1991; Oates, 1977; Yalden, Largen, & Kock, 1976–86; Wolfheim, 1983.

Olive Baboon *Papio anubis* (2 plates)

The baboons of Africa form a series of geographic replacement populations that, like the savannah monkeys, comprise a superspecies consisting of about five currently recognized baboon species. In Ethiopia the sacred baboon (*P. hamadryas*) occurs in the mountainous northeastern part of the country, while the olive or anubis baboon (*P. anubis*) occurs in southwestern areas, with a zone of contact and hybridization along the Awash River, east of Addis Ababa. This is well to the northeast of the location where the specimens obtained on the Abyssinian expedition were collected (near Lake Shala), and so the specific attribution of the drawings almost certainly represents the olive baboon, which was called the dog-faced baboon by W. H. Osgood. The following description thus relates primarily to the olive baboon, which was named after the Egyptian jackal-headed god Anubis, who conducted the dead to their judgment. The hamadryas or sacred baboon was named after the hamadryad wood-nymph spirits of Roman and Greek mythology, who lived only as long as did the tree that supported them.

All of the African baboons are large, mostly terrestrial primates that occupy quite open country and that move about in a quadripedal manner, foraging on a great variety of plant and animal foods. Fruits are eaten in forested habitats, and grasses are consumed in non-wooded areas, but the animals are highly opportunistic as to their dietary flexibility. Among all of them the males are substantially larger than the females; in the sacred baboon females weigh from about 22-33 pounds and males about 33-44 pounds, whereas in the olive baboon females weigh 24-66 pounds, and the males 48-110 pounds. Because of this great sexual dimorphism, males can readily dominate females, and they also take the initiative in defending the troop from possible danger. Although a leopard might take an occasional sick or disabled individual, the effective group defensive behavior and arboreality of baboons protect them well against most large ground predators.

Group size in the olive baboon and its more southern relatives such as the yellow baboon (*P. cynocephalus*) is quite variable, but usually ranges from about 30-60. These include several adults of both sexes, plus a varying number of babies and adolescents. With the males there is a social dominance hierarchy, established by fighting abilities and also the male's capacity for establishing alliances or friendly associations with other males. Position in the male hierarchy is related to mating opportunities. Additionally females also form hierarchies, with the offspring of high-ranking females being dominant to those of lower-ranking ones. Finally, groups having a larger number of adult males can dominate those with fewer males, which favors the development of larger baboon assemblages.

These baboons forage during daytime hours, spreading out and consuming grass, fruit, insects, tree resin, and whatever else happens to be available at that time and place. Adult males establish the direction and rate of the troop's movement, although females may walk ahead of the males, and frequently a young male will take on the role of an advance scout, providing an early warning system in the event of danger.

There are some regional differences in breeding cycles; but in most areas breeding occurs throughout the year, with seasonal peaks in some areas. Female baboons typically become sexually active at about four years, and bear their first offspring at five. There is a gestation period of six months, and usually a single baby is born. Weaning occurs by 6-8 months, and on average there is about a 15-month interval between successive births. Males mature later than females, at about five years, but are not able to achieve the social status required for successful breeding for another 2-5 years.

Olive baboons apparently still occur in many areas of Ethiopia, such as Awash National Park. They also occur in the Bale Mountains, in the central highlands east of the Rift, in the central and southern Rift Valley , as well as the southwestern highlands, western lowlands and northern plateau. It is not a protected species, and is generally subjected to trapping and shooting efforts.

Suggested Reading: Grzimek, 1990; Kingdom, 1971–1982; 1997; Nagel, 1973; Nowak, 1991; Yalden, Largen, & Kock, 1976–86; Wolfheim, 1983.

Gelada *Theropithecus gelada* (6 plates)

Like the mountain nyala and the Ethiopian wolf, the gelada is an Ethiopian endemic, limited to the mountainous regions of central Ethiopia. It is a fairly small baboon, with males usually weighing about 45 pounds, and females about 30 pounds. However, the "magnificent" male shot by Bailey and painted by Fuertes was estimated at 50–60 pounds, and required two young men to carry back to camp. They are rather heavy-bodied apes, with the male's apparent size increased by a long cape around the shoulders, a backward-pointing crest, and pale "whiskers" that produce a handlebar effect. The vernacular name gelada comes from an Arabic word meaning "maned."

The muzzle of the gelada is distinctively concave, producing a dished-in profile, as was well illustrated by Fuertes. The small nostrils tend to open toward the side, rather than terminally, as is the case among all other baboon species. The lips normally cover the long canine teeth, but by retracting the upper lip the pink upper mouth and canines are briefly exposed, producing a distinctive "grin" display. In addition to these rather remarkable features, the male also has a large oval bare area of skin on the chest. This area is mostly bluish gray, but encloses a pink hourglass-shaped patch that mimics the larger and more colorful area of bare skin present on adult females.

Besides being smaller, females lack the crest, cape, whiskers and long canines of males, and are mostly uniform brown. Like males, they have a long and tufted tail, but below the tail is a large oval area of pink skin surrounding the paired bluish ischial pads that provide a cushion when sitting. The periphery of this pink area is swollen with small swollen vesicles during estrus periods. Additionally, the breast area of adult females has a bare hourglass-shaped area of bare skin, which like her genital area is lined externally with pink vesicles (called "beading") that enlarge during estrus periods.

It has been suggested that this anterior exposure of her temporally variable skin helps to advertise the sexual state of the female, even when she is sitting and her actual genitals are hidden from view. The somewhat similar pattern present in males is thought to represent a case of sexual mimicry. Unlike other baboons, the penis of males is usually hidden from view. Evidently the female-like signals present on the chest of the adult males serve to a non-aggressive signal to females that, like the female's chest markings, are readily visible most of the time.

Geladas are ecologically limited to rocky gorges and cliffs, at elevations between about 7500 and 1400 feet. These steep gorges provide safe refuges from predators, and also sleeping sites. After daybreak the animals gradually move out of these gorges and away from the canyon edges, foraging almost exclusively on grasses, and to a very limited degree on other herbaceous vegetation and insects. After spending the day foraging, they animals gradually work back to the gorges. Fuertes' wonderful plate, apparently painted after his return home, provides a vision of this precipitous habitat.

Predation is evidently a minor concern for geladas; large cats are rare in the region, jackals and wolves seem to pose no real threat, and hyenas are active at night, when the geladas are safely back in the cliffside sites. Perhaps some large avian predators such as eagles are a threat to babies, but the watchful care given them by mothers reduces this threat. There may be some mortality resulting from accidental falls over cliff edges. . One study suggested that in a protected population old age and disease are the major mortality factors, and that under favorable conditions a population can increase at a rate of about 16 percent per year, a very rapid rate of increase for any primate.

Because of their largely grass-related foraging behavior, geladas could build up to fairly large densities in favorable areas, at least in earlier times and in undisturbed habitats. Thus, densities of as much as 28-31 animals per square mile. This is a much higher density than is typical of *Papio* baboons. Within such larger areas the population is organized by groups known as "bands." These bands of from 30 to more than 300 animals have largely non-overlapping home ranges with other bands, although some habitat sharing occurs in favorable areas.

Gelada bands are comprised of two general social types. One consists of all male groups, and the other of single-male groups or reproductive units. The all-male groups consist mainly of young individuals, and average about eight individuals. The majority of reproductive units are comprised of a single adult male, up to eight females, and their dependent young. The most common number of adult females in one study was four. The cohesion of such groups is maintained by associations among the females, which are derived from mother-daughter bonds, rather than from the male's ability to dominate and physically control the activities of the females. Social grooming between related females may help to maintain group cohesion. However, some inter-group movement by the females also occurs, which probably reduces inbreeding. Additionally, females participate to some extent in group defense, and may even form alliances against the male leader of the band, which is called the harem male or unit leader. Occasionally additional males, typically young adults, will attach themselves to reproductive units; these are called followers.

Much of the communication that goes on within social units of geladas consists of facial expressions, posturing and vocalizations. One importance facial expression is the "grin" or lip-flip, a briefly exposure of the upper teeth and gum area that serves as a frequently used greeting display, or may also signal uncertainty. Like other apes, an exaggerated yawn serves as a warning signal, but with simultaneous appeasement elements. Eyebrow-raising, which exposes a pink area above the eyelids, serves as a threat, as does staring with the head lowered. Looking away, teeth-chattering and baring the teeth in a snarling manner are all indications of fear or submission. There are collectively more than 50 recognized postural or behavioral elements that carry communicative function, the largest number of which involve associative or sexual signaling, maternal behavior and weaning, and threat or aggression.

Some 25 different vocalizations have been reported for geladas. These include four contact calls, a friendly or greeting call, three calls related to copulation or sexual invitation by females, 11 calls associated with alarm, threat, or fear, a play call, and three calls given by young animals in distress or during separation.

Matings by females are almost entirely limited to unit leaders, with no apparent effort by either sex to search for other partners. Females focus strongly on their unit leader while in estrus; two females different units were observed to copulate nine times during less than ten hours of observation. However, the unit male does not concentrate on a single female in a similar way.

Studies in the Simien Mountains region indicate that there the breeding season is somewhat seasonal, with young mainly born during January and June, but some births occurring in every month except April and October. Elsewhere in this same region the births seemed to be concentrated between February and April. It seems possible that the births of any single band tend to be synchronized, those of others are not. This apparent synchrony within bands may result from females of a single band influencing one another in setting their estrus cycles, a phenomenon fairly common in mammals.

The gestation period of the gelada lasts six months, and there is an average interbirth interval of two years. Weaning occurs at about six months. Females mature at between three to five years, males at about six to eight years. Their maximum lifespan in the wild is unknown, but a

captive survived for more than 20 years. An estimated maximum survival of 20-30 years has been made for wild individuals.

In spite of the gelada's apparently reproductive and survival potential, its population has suffered greatly since Fuertes depicted these wonderful animals. Agricultural expansion has encroached on their range, and they have been shot as crop pests. Countless thousands have been captured for laboratory research over 1,200 were imported into the USA alone during the six-year period ending in 1973. The males have also been shot for their beautiful skins, their capes being made into fur hats to be sold to tourists, or converted into ceremonial costumes or native headdresses. The selective killing of males has altered natural sex ratios, and perhaps has undesirably influenced the social organization of the species. There has also been evidence that climatic changes, such as recent drought effects, have had adverse effects on the population. Human activities may have reduced ecological barriers that traditionally existed between the anubis baboon and this species, perhaps causing hybridization between them.

The gelada is the last surviving species of a grass-eating group of small baboons that was once more widespread in Africa, and of which most species became extinct toward the end of the Pleistocene period. Perhaps the gelada was forced to move into higher elevations as the larger and more omnivorous *Papio* baboons expanded their ranges in the lowlands. It is also possible that early humans found geladas to be fairly easy prey, at least as compared with the larger apes. An estimate of gelada populations as of the 1970's was about 600,000 animals, all on the Amhara Plateau north of the Blue Nile valley, where Simien National Park is located. However, this estimate occurred before the severe droughts of the 1980's.

The animals are currently protected in Simien National Park (so long as it survives), and would be protected in a proposed Blue Nile Gorges National Park. Surprisingly, they do not now occur to the south of Addis Ababa, in the Bale and Arussi highlands, and perhaps never did. They are nationally protected from sport hunting, capture and export, but are not exempt from native hunting or shooting when found to be crop pests. The numbers killed as pests are probably low, but some illegal hunting for skins, especially those of adult males, may still occur. They are listed in Appendix 2 of CITES (Convention on International Trade in Endangered Species), which makes international trade in them or their skins illegal, and are classified as threatened by the International Union for Conservation of Nature & Natural Resources (IUCN).

Suggested Reading; Crook, 1966; Crook & Aldrich-Blake, 1968; Dunbar & Dunbar, 1975; Grzimek, 1990; Kingdom, 1997; Nowak, 1991; Yalden, Largen, & Kock, 1976-86; Wolfheim, 1983.

Grivet Monkey *Cercopithecus aethiops*

Few people visit Africa on wildlife safaris without seeing one or another species of *Cercopithecus* monkeys, collectively termed savannah monkeys or green monkeys. They are the most widespread and common of all African monkeys, and are especially numerous in grassland-forest edge habitats. These habitats provide trees that are important for escape as well as foraging and shade; acacia trees are especially favored because its seeds, flowers, leaves and even its gum are consumed. But they also gather seeds and insects from ground level, and sometimes stray well away from trees or forest edges. The population illustrated by Fuerst is largely limited to Ethiopia, and is notable for its large white cheek patches and a narrow white eyebrow line. Other populations, all of which have at times been considered as comprising a single widespread and variable species, differ somewhat in these features and their general pelage color, which varies from greenish (thus, "green monkeys") to dark gray. The general vernacular name "grivet" is from the French, meaning grayish or grizzled. The savannah monkeys are part of a larger group called guenons, which in French means "fright," and refers to the fact that the animals expose their teeth and grimace in fear or anger. Most of these monkeys have distinctive facial patterns that emphasize such expressions, and provide important social signals for these highly visual animals. The blue areas of the genitalia of males provide another important source of visual signaling.

Savannah monkeys form bands that vary in size from about 5-75 animals, and which consist of adults of both sexes, as well as immatures. The animals are organized into a clear social hierarchy with the males usually dominant, although sometimes females may form coalitions that modify this strict rank order. Independent juveniles may separate from the adults and form their own subgroup.

Suggested Reading: Dunbar & Dunbar, 1975; Gautier-Hion *et al.*, 1988; Grzimek, 1990; Kingdom, 1971-1982; 1997; Nowak, 1991; Rowell, 1971; Struthsaker, 1967a, b; Yalden, Largen, & Kock, 1976-86.

Velvet Rat *Colomys goslingi*

W. H. Osgood described this rather odd-looking rat as constituting a new genus and species, but now it is regarded as a probable subspecies of the widely distributed velvet rat or African water rat. It is a rather long-tailed rat, with notably long vibrissae or "whiskers." It has a distinctly two-toned pelage that is dark brown above and white below, the two colors sharply demarcated rather than blending gradually. There is also a small white mark at the base of the ear. The entire pelage is velvety in texture, but the tail is only slightly haired. Adults average about two ounces, and the tail is longer than the rest of the head and body.

In some ways the species seems highly adapted to a semi-aquatic existence. Thus, its lips cover the incisors, rather than exposing the mouth to water entry. It probably catches most of its food by wading in shallow water, using its sensitive vibrissae to detect prey, or probably also using its large eyes to visually locate them. Aquatic insects, crustaceans, worms and similar prey are all taken. Osgood collected his single specimen along an unnamed stream, and it is usually found near running water in wooded country. It constructs muskrat-like (but much smaller) tunnels in steambanks, and similarly swims well, using its hind legs rather than its tail for propulsion. Evidently the species is essentially solitary and nocturnal.

Nothing is known of the breeding season in Ethiopia, but in Uganda and Zaire breeding evidently occurs between March and July. The gestation period and most other aspects of reproduction are still unknown, but pregnant females have been taken with three embryos. Males have chest glands that produce a yellowish fluid when they are sexually active and that presumably serves as a sexual attractant.

Suggested Reading: Kingdom, 1971–1982; 1997; Nowak, 1991; Osgood, 1928; Yalden, Largen, & Kock, 1976–86.

Abyssinian Root-rat *Tachyoryctes splendens*

There are many species of rats in Africa; the mole-rats or root-rats comprise one genus occurring from Ethiopia south to Tanzania. Two species are found in Ethiopia; as mentioned in the account of the Ethiopian wolf they provide important prey for that canid. The present species is the smaller of the two, weighing up to about a half-pound, whereas the other may approach two pounds. In both, the body resembles that of a large mole, with reduced eyes and ears, a short tail, thick fur, with an abundance of tactile vibrissae on the muzzle area. The legs are short and adapted for digging, and the incisors are long and protruding. In brief, the animals greatly resemble the pocket gophers of North America, although they lack external cheek pouches. Their generic name means “rapid digger.”

These rats are often extremely abundant in areas of montane meadows and moorland, where they produce large mounds and excavate extensive underground tunnel systems. These foraging tunnels are just below the surface, and connect to a nesting chamber. Roots, tubers, and stems are their primary foods, which are pulled underground from the periphery of their tunnels. These materials are then sorted, and non-edible materials are added to midden-mounds. When excavating tunnels the incisors are the primary tools, with the feet being used to grasp the sides of the tunnel and also for pushing aside loosened soil. Sometimes the animals will also come to the surface to collect vegetation for eating and for nesting materials, but this is probably rather risky, in terms of predation vulnerability.

Breeding evidently occurs throughout the entire year, but is most intense during the wet season, when maximum vegetation growth is occurring. Females reportedly have two litters in rather rapid succession, after a gestation period of around seven weeks. As many as three or four young per litter have been reported, but one or two are usual. Sexual maturity occurs by six months of age, so females might become mothers before their first birthday.

Suggested Reading: Kingdom, 1997; Nowak 1991; Yalden, Largen, & Kock, 1976–86.

Slender Mongoose *Herpestes sanguinea*

Mongooses are mammals that older Americans know only from the writings of Rudyard Kipling, and younger ones perhaps only from Disney's film *The Lion King*. Neither is a very reliable portrait of these little carnivores, which are widespread in the Old World, and include about two dozen African species. They are mostly cat-sized, and like cats tend to be both nocturnal and solitary. All have large canines, a pointed muzzle, small ears and eyes, rather short legs, and rather long tails. In spite of their short legs they can be extremely agile, and as is well known to readers of *The Jungle Book*, often killing deadly snakes by their astonishingly rapid reflexes. Many also roll and crack large bird eggs by crashing them against rocks, or prey on various vertebrates and larger invertebrates. Some species are social, especially the smaller diurnal ones, presumably as an anti-predator device. Most tend to be grizzled gray in color, sometimes with darker back banding.

The species shown by Fuertes is one of the medium-sized, widespread species, notable for its elongated body and tail, and its semi-arboreal behavior. There are about 70 named subspecies, with great variation in pelage color. These varied forms occur in many habitats, especially at least partly wooded ones. They feed on a great variety of prey, caught mostly during daylight hours. Both sexes maintain hunting territories, which are regularly marked with secretions of anal glands or cheek glands. Periodic scanning of the environment in an erect standing posture is alternated with rapid horizontal running. This species may travel largely alone, or in pairs, and its home range may be less than a half a square mile in good habitat, but is larger in desert-like areas.

Long-lasting but loose associations between pairs achieve breeding. The young are born after an approximate two-month gestation period, and like baby cats are born blind and helpless. However, within ten weeks they are independent, remaining with their mother until she has her next litter. Typically two litters are produced each year.

Suggested Reading: Hinton & Dunn, 1967; Grzimek, 1990; Kingdom, 1971–1982; 1997; Nowak, 1991; Taylor, 1975; Yalden, Largen, & Kock, 1976–86.

Ethiopian Wolf *Canis s. cister*(2 plates)

This wolf has been called by various names, such as the "Simien jackal," "Simien fox," and others. It was thus named for the area where it was first discovered, the Simien (or Semyen) Mountains of north-central Ethiopia, which include the highest elevations in the entire country. It also occurs (as a larger and darker subspecies) in the Bale Mountains of southern Ethiopia. The specimen painted and drawn by Fuertes is of the southern population, and was obtained near Lake Zawai.

Although this species' rather pointed face and pointed ears gives it a somewhat fox-like appearance, it is distinctly wolf-like in its long legs and substantial size, with adults weighing 30 to 40 pounds. Its long, drawn-out scream is also wolf-like, although yapping notes are sometimes also produced. Several other vocalizations have also been described, such as bleating, yelping and barking.

Ethiopian wolves share their limited region with three species of jackals, all of which are somewhat smaller than the wolf, some substantially smaller foxes (*Vulpes*), and the larger wild dog (*Lycaon*), which is now very rare everywhere. Compared with Ethiopian wolves, wild dogs concentrate on larger prey, such as small antelopes, and the foxes and jackals exploit an extremely wide variety of small mammals, birds, reptiles, invertebrates, insects and carrion.

These wolves typically occur on high meadows and moorlands where rodents are abundant, especially the root-rats or mole-rats. One of these species, the giant mole-rat (*Tachyoryctes macrocephalus*) is probably the most important single prey of this wolf. Other prey includes various smaller rodents and hares. Most of the rodents are caught by ambush or chases, rather than by digging them out of their burrows. Believed (without justification) to be a sheep predator by settlers, the species has been greatly persecuted unjustly, as were North American wolves. Originally, these wolves were mainly daytime hunters, but with increasing human activity they have become largely nocturnal and more elusive.

Like other wolves, these animals are organized into highly integrated packs, which consist of several females and several closely related males, plus the offspring of the dominant pair. Such a pack may occupy a territory of up to about ten square miles. Foraging on their usual small prey is typically done individually, but much time is also spent by the group for resting, sleeping, or feeding dependent pups.

Molecular biology has provided recent evidence that this species is neither a fox nor a jackal, but instead its nearest relative is the Eurasian wolf. It differs ecologically from this much more widespread species, especially in its concentration on small rodents. Quite possibly, competition with the wild dogs of central and southern Africa prevented it from expanding its range beyond northeast Africa following original invasion, perhaps during Pleistocene times.

Besides the effects of direct killing of these wolves by humans, the species has also suffered from habitat loss through conversion of meadows and moorland to agriculture. Furthermore, it has been adversely affected by contact with domestic dogs, which has apparently introduced canine diseases into the population. It is now classified as highly endangered, with only about 50 individuals estimated remaining as of about 1990 in the Simien Mountains. Another 16 were present around Mt. Amba Farit west of Dese, and about 30 more were in the high plateau region north of Addis Ababa. Finally, about 300 individuals of the southern race were believed to be present in the Bale Mountains, in the southern highlands. The Bale Mountains are the location of a fairly new national park, and the Simien Mountains are the site of another. However, grazing still occurs in both, and so the long-term survival of the Ethiopian wolf would

seem to be quite questionable. It is already the rarest canid in Africa, and will probably be the first to become extinct.

Suggested Reading: Bueler, 1973; Fox, 1974; Grzimek, 1990; Kingdom, 1997; Nowak, 1991; Yalden, Largen, & Kock, 1976–86.

Hyrax (Procavidae)

The hyraxes are a strange group of rodent-like animals that remind North Americans of either marmots or woodchucks. Indeed, hyraxes were originally classified with rodents, and somewhat later with elephants and rhinoceroses. Finally, T. H. Huxley separated them as a discrete order, recognizing their many unique attributes. They are now placed near the odd-toed ungulates such as the horses, tapirs and rhinoceroses, but they are regarded as “near-ungulates,” inasmuch as they lack true hooves. Both modern and fossil hyraxes occur only in Africa and adjacent Arabia. They have tusk-like incisors, so gnawing functions are given over to the molars (canines are lacking). One result of this is that the foraging adaptations of hyraxes are less adapted than are those of rodents, and over geologic time most of the early hyrax forms died out. Currently three general hyrax types exist, the rock hyraxes (five species), the bush hyraxes (three species), and the tree hyraxes (three species). They are all about the size of small marmots (three to ten pounds). The blunt-nosed rock hyraxes are most widespread and inhabit rock outcrops, the longer-nosed bush hyraxes occur both in rock and wooded areas, and the tree hyraxes are least widespread and are most arboreal. They also have blunt noses, a longer pelage and a distinctively colored white to russet patch of long dorsal fur surrounding a naked and glandular skin area. Fuertes identified his drawing as “*Dendrohyrax* sp.” but Ethiopia is well beyond the known range of this genus, and it seems more likely that it represents a rock hyrax (*Procavia*). His frontal view shows the long eyebrow-like hairs that help shade the eyes from direct sunlight. All hyraxes are highly vocal, and produce calls that range from grunting sounds to loud screams. The tree hyraxes are mostly nocturnal, and are particularly vocal then. Hyraxes are quite social, and often engage in contact behavior such as huddling or rubbing against one another.

Suggested Reading: Grzimek, 1990; Hoeck, Klein & Hoeck, 1982; Kingdom, 1997; Nowak, 1991; Yalden, Largen, & Kock, 1976–86.

Mountain Nyala *Tragelaphus buxtoni*

This rare antelope is limited to the highlands of Abyssinia, and collecting specimens of it apparently was one of the primary goals of the Abyssinian expedition. It was discovered relatively late (1905), and is classified with a group of antelopes (such as the bushbuck, bongo, and kudus) that have spotted and striped pelages, and horns forming a graceful open spiral. Most are fairly large antelopes; the mountain nyala weighs about 300–700 pounds, with the males considerably larger than females. Fuertes' plate shows three males; the females are hornless. Females are also much paler, with a few faint stripes and spots on the back and sides. Both sexes also have white markings on the cheeks, the front of the neck, and on the underside of the tail. The animals once roamed over much of the southern Ethiopian highlands, but now are limited to the Bale Mountains. In the late 1980's about 3,000 still survived there (less than half the 1960's numbers), with about a third protected in the Bale National Park. Considered threatened by the IUCN.

Mountain nyala occupy montane forests and heathland mainly between about 9,300 and 12,000 feet elevation, and occur in groups numbering from a few up to 90, with old males generally being solitary. During the dry season they are found mainly in the woodlands, where they browse on herbs and shrubs, but during wetter times they may move to more grassy areas at lower elevations. For much of the year the usual social groups are made up of females with dependent young, accompanied by one or more males. Young males form more mobile bachelor groups until they are old enough to compete with adults. The breeding season peaks about December, when males perform aggressive circling displays toward one another. The gestation period lasts eight or nine months, with young being born around the end of the wet season. The fawns remain hidden for a few months between nursings, and gradually begin to move about with their mothers. By the end of two years they are mature.

Suggested Reading: Grzimek, 1990; Kingdom, 1997; Leuthold, 1977; Nowak, 1991; Yalden, Largen, & Kock, 1976–86.

Bush Duiker *Sylvicapra grimmia* (plates)

Bush duikers are part of a large group of small antelopes that are widespread in sub-Saharan Africa. All but one of the 17 species of duikers are in the group called forest duikers (genus *Cephalophus*); this single and very widespread species of bush duiker (or common duiker) is more adapted to savannas, grasslands, and even alpine zones. The name "duiker" is from the German *Ducker*, meaning "diving buck," and in reference to their tendency to dive into heavy cover when threatened. Compared with other African antelopes they are not swift runners, and rely on concealment for protection. However, they also have relatively large brains, and are noted for their alertness and intelligent behavior.

Adults stand only about two feet tall at the shoulder, and weigh about 25–50 pounds, the females averaging somewhat heavier than males. Although in the forest duikers both sexes are horned, only male bush duikers usually possess horns; these are short, nearly straight and very sharp. The ears of the bush duiker are longer and more pointed than are those of forest duikers, and a black streak extends down the muzzle to the black nose. The rest of the pelage is most rich tawny brown on the head and foreparts, becoming more grayish on the back and rump. The tail is short, with a black upper surface and white underside. The conspicuous black muzzle streak and white underside of the tail are presumably important visual signals that supplement the glandular secretions and excretory scents used in social and sexual interactions. The short horns are probably important in territorial sparring as well as in defensive behavior.

A large preorbital gland is located just below and in front of each eye, and is important in territorial marking. Bush duikers have longer legs than forest duikers, and not only can run rapidly, but also can leap explosively when threatened. The animals are adapted for browsing rather than grazing, and consume the leaves of trees and bushes, fruits, flowers, bark, and some animal materials including even carrion. In the case of forest duikers small animals, especially birds, may at times be killed and eaten, but fruits and leafy materials probably make up most of the usual diet. Bush duikers can survive indefinitely without access to water. Bush duikers are usually found alone; adult males occupy apparently non-overlapping territories, which may enclose the home ranges of one or more females. The sexes spend little time together, males preferring to select higher and more open areas providing unrestricted visibility for resting, while females are more prone to be found in lower, better vegetated areas where there are more opportunities for effective hiding.

During the breeding season a good deal of chasing occurs, as well as aggression and fighting among the competing males. Probably gestation lasts about six months, with a single fawn being the rule. As noted earlier, these tiny babies are vulnerable to attack from a variety of predators, but females actively defend them by butting and kicking. Males will also come to the defense of young. Adult size is reached in little more than six months, and often females will have produced their first young when they are only about a year old.

Bush duikers are still common and widespread in Africa; however some of the forest duikers are rare, vulnerable or endangered. Their small size makes for poor trophies, but natives hunt them for consumption, and forest habitat destruction has been a serious influence for some of these species. Collectively, duikers show a considerable range in size and ecology, subdividing their habitats according to usual food type, relative diurnality or nocturnality in activity pattern, and body size. The smallest species are seemingly the most generalized, and forage from the forest floor on a variety of herbaceous materials. Other species are variably more fruit-adapted or

omnivorous, but probably all depend to some extent on the availability of foods dropped by monkeys and birds from the canopy above.

Suggested Reading: Dunbar & Dunbar, 1979; Grzimek, 1975; Kingdom, 1997; Leuthold, 1977; Nowak, 1991; Yalden, Largen, & Kock, 1976-86.

Klipspringer *Oreotragus oreotragus saltatrixoides*

This is a tiny antelope, weighing only about 20–40 pounds, and standing about 20 inches high at its shoulders. Males have short horns that nearly straight but are ringed at the base. Females are usually hornless, but in some areas (such as Ethiopia) females occasionally also possess horns. The pelage of this arid-adapted subspecies is mostly creamy yellow, dappled with olive, and grading to grayish below, providing a concealing pattern against their rocky background. Klipspringers (their name is German and means “cliff-jumper”) are limited to rocky habitats, where they walk on the tips of their hooves. The species is able to stand on the peaks of tiny rocky outcrops. Its pelage is unusually thick, apparently serving as a cushion against falls, and is also hollow, probably providing for excellent insulation at the high altitudes where the animals are often found.

Klipspringers browse on herbs, shrubs and the like, with grasses making up only a small part of their diet. The animals are usually found in small groups, consisting of a male, a female, and her offspring. These family groups establish home ranges within the male’s permanent territory, which range from about 20 to 100 acres. The pairs remain in nearly constant contact by whistling, and facial glands in front of the eyes of both sexes are also certainly important in social interactions. Territories are marked by secretions of this gland, as well as by stool deposition. Females become sexually mature at the end of their first year; males somewhat later. The breeding season in Ethiopia occurs during August and September. Probably only those males able to establish and maintain territories are able to breed. The gestation period lasts about seven months, and a single fawn is born. Since the newborn baby weighs only about two pounds it might be easy prey for eagles and other predators. It remains well hidden for the first two or three months, and becomes weaned by about two months later. The young males leave the family group at sexual maturity at a year, but females remain longer, and may even mate with their fathers.

Suggested Reading: Dunbar & Dunbar, 1974a; Grzimek, 1990; Kingdom, 1997; Leuthold, 1977; Nowak, 1991; Yalden, Largen, & Kock, 1976–86.

Bohor Reedbuck *Redunca redunca fulvorufula*

This rather small antelope weighs only about 50–200 pounds when adult, and is about the color of white-tailed deer (*Odocoileus virginianus*), with a similarly white and bushy tail. Also in common with white-tailed deer, they lift the tail in alarm and when fleeing. The male's horns are rings and curved, first pointing backwards, and then recurved toward their tips. The females are hornless. Males have dark, glandular patches just below their ears, as well as groin glands. The species occurs from Ethiopia south to South Africa, in Ethiopia it is restricted to rather mountainous and similarly irregular terrain, where they are grazers on grass and other soft vegetation. I have seen this species in Kenya only in rather tall reedy vegetation, where they probably hide for much of the daylight period, foraging only near dawn and dusk, or during the night. Most of the acoustic communication is achieved by whistles and loud bounding noises.

Although some herding may occur during stressful periods when water may be in short supply, for much of the year the animals consist of small groups consisting of a territorial male and a small number of females and their young. The females and their dependent young may themselves remain rather isolated in small areas, within the male's overall territory. The male's territory includes a source of water, grazing areas, and resting sites. Not all males are able to find suitable breeding territories, and hostile displays or fighting between competing males may occur.

Although in southern Africa breeding may occur throughout the year, it is probably quite seasonal in most areas. Females mature at no more than two years, and pregnancy lasts about eight months. The young fawn is tended by its mother until shortly before the birth of the next offspring. Probably the animals are fairly easy prey for leopards and other cats, as they are not very wary, and are quite defenseless against such predators.

Suggested Reading: Grzimek, 1990; Hendrichs, 1975; Kingdom, 1997; Leuthold, 1977; Nowak, 1991; Yalden, Largen, & Kock, 1976–86.

Appendix 1

List of Plates, Alphabetic by Original Generic Names, with Museum Numbers, Provinces & Collection Sites*

Pencil Drawings

<u>Latin Name</u>	<u>English Name</u>	<u>FM No.</u>	<u>Province; Site</u>
<i>Actophilornis africana</i>	African jacana	46	Gojjam; Dundulbar
<i>Aquila rapax raptor</i>	Tawny eagle	24	Gojjam; Njabara
<i>Aquila rapax raptor</i>	Tawny eagle	71.2	Gojjam; Njabara
<i>Canis simensis</i>	Abyssinian wolf	73	Arusi; Mt. Abasso
<i>Centropus s. superciliosus</i>	White-browed coucal	55	Galla; Gidu River camp
<i>Cephalophus abyssinica</i>	Abyssinian duiker	88	Gojjam; near Njabara
<i>Cercopithecus djamdamensis</i>	Guenon (Grivet) monkey	93	Sidamo; Mt. Guramba
<i>Choriotis struthiunculus</i>	Somali greater bustard	44	Galla; Gidu River camp
<i>Colobus polykomos abyssinicus</i>	Guereza monkey	78	No location indicated
<i>Colobus polykomos abyssinicus</i>	Guereza monkey	91	No location indicated
<i>Colomys goslingi</i>	Abyssinian water (velvet) rat	87	Gojam; Little Abbai River
<i>Corvultur crassirostris</i>	Thick-billed raven	71.3	Gojjam; Njabara
<i>Corvus capensis kordofanensis</i>	Lesser Cape rook	67	Galla; Awash R. upper camp
<i>Dendrohyrax</i> sp.	Tree cony (= <i>Hyrax</i> , rock hyrax?)	96	Arusi; Wadago
<i>Gypaetus barbatus meridionalis</i>	Bearded vulture	27	Arusi; Mt. Albasso, 12,700 ft.
<i>Gypaetus barbatus meridionalis</i>	Bearded vulture	28	No location indicated
<i>Gypaetus barbatus meridionalis</i>	Bearded vulture	29	Arusi; Mt. Albasso, 12,700 ft.
<i>Herpestes sanguinea</i>	Slender mongoose	107	Gojjam; near Dambracha
<i>Milvus migrans aegyptius</i>	Egyptian kite	71.1	Gojjam; Njabara
<i>Mungos gracilis</i> , see <i>Herpestes sanguinea</i>			
<i>Nilopegamys plumbeus</i> , see <i>Colomys goslingi</i>			
<i>Oreotragus oreotragus saltatrixoides</i>	Abyssinian klipspringer	76	Shoa; Mulu
<i>Papio cynocephala</i> .	Dog-faced (Olive) baboon	104	No location indicated
<i>Papio cynocephala</i> .	Dog-faced baboon;	105	Galla; Awada R., nr. Mt. Duro
<i>Pseudogyps africanus</i>	African white-necked vulture	34	Gojjam; Njabara
<i>Pseudogyps africanus</i>	African white-necked vulture	71.4	Gojjam; Njabara
<i>Redunca bohor</i>	Bohor reedbuck	75	Arusi; Mt. Albasso; 10,000 ft.
<i>Tachyoryctes splendens</i>	Abyssinian mole-rat (root-rat)	77	Shoa; Addis Ababa, Entoto
<i>Theropithecus gelada</i>	Gelada baboon	95	Shoa; Mulu
<i>Theropithecus gelada</i>	Gelada baboon	96	Shoa; Mulu
<i>Theropithecus gelada</i>	Gelada baboon	99	Shoa; Mulu
<i>Theropithecus gelada</i>	Gelada baboon	101	Shoa, Mulu
<i>Theropithecus gelada</i>	Gelada baboon	102	Shoa; Mulu
<i>Torgos tracheliotis nubicus</i>	Eared (Lappet-faced) vulture	32	Bale; Dodolo, 10-15 m. SE
<i>Turacus l. donaldsoni</i>	Galla white-cheeked plantain-eater	53	Arusi; Wadago
Watercolors			
<i>Afribyx s. senegalensis</i>	Senegal wattled plover	47	Gojjam; 5 mi. S of Debra Markos
<i>Anas undulata rueppelli</i>	Abyssinian yellow-billed duck	10	Galla; Awash R., NW of Mt. Zukwa
<i>Apaloderma n. narina</i>	Narina trogon	56	Sidamo; Mt. Guramba

<i>Aquila rapax raptor</i> Tawny eagle	23	Gojjam; Njabara
<i>Ardea melanocephala</i> Black-headed heron	2	Gojjam; Bichana
<i>Bostrychia carunculata</i> Wattled ibis	6	Gojjam; Njabara & Dangila
<i>Bucorvus abyssinicus</i> Abyssinian ground hornbill	61	Shoa; 50 mi. N of Addis Ababa
<i>Buphagus e. erythrorhynchus</i> Red-billed oxpecker	70	Sidamo; Ladu
<i>Burhinus sengalensis</i> Senegal stone curlew	49	Galla; Gidu R., Lake Shala
<i>Bycanistes cristatus</i> Crested hornbill	63	Sidamo; near Alata
<i>Bycanistes cristatus</i> Crested hornbill	64	Sidamo; near Alata
<i>Canis sinensis</i> Abyssinian red wolf	74	Arusi; Mt. Albasso; 10,700 ft
<i>Cephalophus abyssinicus</i> Abyssinian duiker	89	Gojjam; near Njabara
<i>Chelictinia riocourii</i> African Swallow(-tailed) kite	14	Gojjam; near Matemma
<i>Choriotis struthiunculus</i> Somali greater bustard	43	Galla; Gidu River camp
<i>Colobus polykomos abyssinicus</i> Guereza monkey	106	Gojjam; Amedamit Mts., nr. Sakalla
<i>Colobus polykomos abyssinicus</i> Guereza monkey	109	Gojjam; Amedamit Mts., nr Sakalla
<i>Corvultur crassirostris</i> Thick-billed raven	66	Shoa; Mulu, Mugger R.
<i>Corythornis c. cristata</i> Crested pygmy kingfisher	58	Gojjam; 25 m W of Lake Tana
<i>Crinifer zonurus</i> Gray plantain eater	54	Gojjam; Lake Tana
<i>Cuncuma vocifer</i> African sea eagle	15	Galla; Lake Zwei
<i>Cuncuma vocifer</i> African sea eagle	16	Galla; Bulbula R., Lake Zwei
<i>Elanus caeruleus</i> Black-shouldered kite	13	Gojjam; Bichana
<i>Epihippiorhynchus senegalensis</i> Saddle-billed stork	4	Galla; Hoya, Suksuk R.
<i>Falco biarmicus abyssinicus</i> Abyssinian lanner	39	Gojjam; Njabara
<i>Francolinus c. sharpii</i> Abyssinian Clapperton francolin	40	Gojjam; Metemma
<i>Gymnogenys typicus typicus</i> African harrier hawk	36	Sidamo; near Ladu
<i>Gymnogenys typicus typicus</i> African harrier hawk	37	Shoa; Mulu, Sanford's Ranch
<i>Gypaetus barbatus meridionalis</i> Bearded vulture	25	Arusi, Mt. Albasso; 10,700 ft.
<i>Gypaetus barbatus meridionalis</i> Bearded vulture	26	Arusi, Mt. Albasso; 10,700 ft.
<i>Halcyon l. leucocephala</i> Gray-headed kingfisher	57	Gojjam; 25 mi. west of Lake Tana
<i>Helotarsus ecaudatus</i> Bateleur eagle	17	Gojjam; near Njabara
<i>Helotarsus ecaudatus</i> Bateleur eagle	18	Gojjam; near Njabara
<i>Helotarsus ecaudatus</i> Bateleur eagle	19	Gojjam; near Njabara
<i>Helotarsus ecaudatus</i> Bateleur eagle	20	Gojjam; near Njabara
<i>Hoplopterus spinosus</i> Spur-winged plover	48.2	Galla; Gidu River camp
<i>Ispidina p. picta</i> Pygmy (Malachite) kingfisher	59	Gojjam; near Gendoa
<i>Lissotis melanogaster</i> Black-bellied bustard	45	Gojjam; Lake Tana, nr. Dungulbar
<i>Lophaetus occipitalis</i> Crested hawk-eagle	21	Sidamo; Shushumana
<i>Lophaetus occipitalis</i> Crested hawk-eagle	22	Galla; Lake Tana, Dungulbar
<i>Lophoceros hemprichii</i> Hemprich's hornbill, see <i>L. erythrorhynchus</i>		
<i>Lophoceros erythrorhynchus</i> Red-billed hornbill	62	Galla; Lake Zwei
<i>Lybius b. aethiops</i> Abyssinian double-toothed barbet	65	Sidamo; Ladu
<i>Megalornis. grus</i> European crane	42	No location indicated
<i>Necrosyrtes monachus</i> Common African (Hooded) vulture	33	Gojjam; near Solay village
<i>Neophron p. percnopterus</i> Egyptian vulture	35	Gojjam; Bichana
<i>Nettion capense</i> Cape wigeon (teal)	9	Galla; Hora Abyata
<i>Nurnida m. major</i> Uganda tufted guinea-fowl	41	Galla; Awada R., E of L. Shala
<i>Nycticorax leuconotus</i> African night heron	3	Gojjam; Ambo Hot Springs
<i>Phoenicopterus ruber antiquorum</i> Greater flamingo	7	Galla; Bulbula
<i>Platysteira c. aethiopica</i> Brown-throated wattle-eye	68	Sidamo; Sisha,, W base of Mt. Gura

<i>Plectropterus g. gambensis</i>	Spur-winged goose	8	Gojjam; Lake Tana
<i>Polihierax s. castanotus</i>	Abyssinian pygmy falcon	38	Galla; Lake Shala, E shore
<i>Poliocephalus ruficollis</i>	African little grebe	1	Galla; Awash R. NW of Mt. Zukwa
<i>Prionops concinnata</i>	Nile helmet-shrike	69	Gojjam; Lake Tana
<i>Pterocles quadricinctus lowei</i>	Lowe's sand grouse	50	Gojjam; Metemma
<i>Sagittarius serpentarius</i>	Secretary bird	11	Gojjam; Dengela
<i>Sagittarius serpentarius</i>	Secretary bird	12	Gojjam; Dengela
<i>Stephanibyx coronatus</i>	Crowned lapwing	48.1	Galla; Gidu R. camp
<i>Terathopius</i> , see <i>Helotarsus</i>			
<i>Theropithecus gelada</i>	Gelada baboon	108	Painted after return
<i>Theropithecus gelada</i>	Gelada baboon	102	Shoa; Mugger Cañon Rim, Mulu
<i>Theropithecus gelada</i>	Gelada baboon	103	Shoa, Mulu
<i>Threskiornis a. aethiopicus</i>	Sacred ibis	5	Gojjam; Mescala Christo
<i>Torgos tracheliotis nubicus</i>	Eared (Lappet-faced) vulture	31	Bale; Gedab Mts., 10-15 mi. SE
<i>Trigonoceps occipitalis</i>	White-headed vulture	30	Bale; Gedab Mts.
<i>Turacus l. donaldsoni</i>	Galla white-cheeked plantain-eater	52	Arusi; Wedago
<i>Turacus l. donaldsoni</i>	Galla white-cheeked plantain-eater	-	(Painted after return?)
<i>Upupa e. epops</i>	European hoopoe	60	Gojjam; no site indicated
<i>Vinago waalia</i>	Bruce's green pigeon	51	Galla; Lake Zwai
Unidentified Hemipteran		79	Blue Nile Canyon

*Names used on Fuertes' original images, in *Album of Abyssinian Birds*, or in Museum records. English vernacular names show modern equivalents where confusion is likely

Appendix 2

List of Plates, Alphabetic by Original English Names, with Museum Numbers, Dates and Provinces

English Name	Latin Name	F.M. No.	Date	Province
Abyssinian brown-throated wattle-eye	<i>Platysteira cyanea aethiopica</i>	68	24 Dec. '26	Sidamo
Abyssinian Clapperton francolin	<i>Francolinus clappertoni sharpii</i>	40	16 Apr. '27	Gojjam
Abyssinian double-toothed barbet	<i>Lybius bidentatus aethiops</i>	65	26 Dec. '26	Sidamo
Abyssinian duiker	<i>Cephalophus abyssinicus</i>	89	20 Mar. '27	Gojjam
Abyssinian duiker	<i>Cephalophus abyssinica*</i>	88	20 Mar. '27	Gojjam
Abyssinian gray plantain-eater	<i>Crinifer zonurus</i>	54	31 Mar. '27	Gojjam
Abyssinian ground hornbill	<i>Bucorvus abyssinicus</i>	61	14 Feb. '27	Sidamo
Abyssinian klipspringer	<i>Oreotragus oreotragus saltatrixoides*</i>	76	22 Oct. '26	Shoa
Abyssinian lanner	<i>Falco biarmicus abyssinicus</i>	39	22 Mar. '27	Gojjam
Abyssinian mole-rat	<i>Tachyoryctes splendens*</i>	77	18 Oct. '26	Shoa
Abyssinian pygmy falcon	<i>Poliocerax semitorquatus castanotus</i>	38	2 Jan. '27	Galla
Abyssinian red wolf	<i>Canis sinensis</i>	74	11 Nov. '26	Arusi
Abyssinian red wolf	<i>Canis sinensis*</i>	73	11 Nov. '26	Arusi
Abyssinian tawny eagle	<i>Aquila rapax raptor</i>	23	23 Mar. '27	Gojjam
Abyssinian tawny eagle*	<i>Aquila rapax raptor</i>	24	23 Mar. '27	Gojjam
Abyssinian tawny eagle*	<i>Aquila rapax raptor</i>	71.2	23 Mar. '27	Gojjam
Abyssinian water rat	<i>Nilopegamys plumbeus*</i>	87	21 Mar. '27	Gojjam
Abyssinian yellow-billed duck	<i>Anas undulata rueppelli</i>	10	18 Jan. '27	Galla
African harrier hawk	<i>Gymnogenys typicus typicus</i>	36	26 Dec. '26	Sidamo
African harrier hawk	<i>Gymnogenys typicus typicus</i>	37	21 Oct. '26	Shoa
African jacana*	<i>Actophilornis africana</i>	46	1 Apr. '27	Gojjam
African lammergeyer	<i>Gypaetus barbatus meridionalis</i>	25	13 Nov. '26	Arusi
African lammergeyer	<i>Gypaetus barbatus meridionalis</i>	26	12 Nov. '26	Gojjam
African lammergeyer*	<i>Gypaetus barbatus meridionalis</i>	27	13 Nov. '26	Arusi
African lammergeyer*	<i>Gypaetus barbatus meridionalis</i>	28	Undated	Arusi?
African lammergeyer*	<i>Gypaetus barbatus meridionalis</i>	29	13 Nov. '26	Arusi
African little grebe	<i>Poliocephalus ruficollis</i>	1	18 Jan. '27	Galla
African sea eagle	<i>Cuncuma vocifer</i>	15	10 Jan. '27	Galla
African sea eagle	<i>Cuncuma vocifer</i>	16	12 Jan. '27	Galla
African swallow-tailed kite	<i>Chelictinia riocourii</i>	14	15 Apr. '27	Gojjam
African white-necked vulture	<i>Pseudogyps africanus</i>	?	29 Nov. '26	Sidamo
African white-necked vulture*	<i>Pseudogyps africanus</i>	34	21 Mar. '27	Gojjam
African white-necked vulture*	<i>Pseudogyps africanus</i>	71.4	21 Mar. '27	Gojjam
Bateleur	<i>Terathopius ecaudatus</i>	17	20 Mar. '27	Gojjam
Bateleur	<i>Terathopius ecaudatus</i>	18	20 Mar. '27	Gojjam
Bateleur	<i>Terathopius ecaudatus</i>	19	20 Mar. '27	Gojjam
Bateleur	<i>Terathopius ecaudatus</i>	20	20 Mar. '27	Gojjam
Black-bellied bustard	<i>Lissotis melanogaster</i>	45	29 Mar. '27	Gojjam
Black-headed heron	<i>Ardea melanocephala</i>	2	20 Feb. '27	Gojjam
Black-shouldered kite	<i>Elanus c. caeruleus</i>	13	1 Mar. '27	Gojjam
Bohor reedbuck	<i>Redunca bohor*</i>	75	10 Nov. '26	Arusi
Bruce's green pigeon	<i>Vinago waalia</i>	51	13 Jan. '27	Galla
Cape wigeon	<i>Anas capensis</i>	9	8 Jan. '27	Galla

Crested pygmy kingfisher <i>Corythornis c. cristata</i>	58	8 Apr. '27	Gojjam
Crowned lapwing <i>Stephanibyx coronatus</i>	48.1	3 Jan. '27	Galla
Dog-faced baboon <i>Papio cynocephala</i> .*	104	Undated	Galla?
Dog-faced baboon <i>Papio cynocephala</i> .*	105	31 Dec. '26	Galla
Eastern four-banded sandgrouse <i>Eremialector quadricinctus lowei</i>	50	17 Apr. '27	Gojjam
Egyptian kite* <i>Milvus migrans aegyptius</i>	71.1	21 Mar. '27	Gojjam
Egyptian vulture <i>Neophron p. percnopterus</i>	35	21 Feb. '27	Gojjam
European crane <i>Grus g. grus</i>	42	Undated	?
European hoopoe <i>Upupa e. epops</i>	60	6 Apr. '27	Gojjam
Galla white-cheeked plantain-eater <i>Turacus leucotis donaldsoni</i>	52	19 Nov. '26	Arusi
Galla white-cheeked plantain-eater* <i>Turacus leucotis donaldsoni</i>	53	19 Nov. '26	Arusi
Galla white-cheeked plantain-eater* <i>Turacus leucotis donaldsoni</i>	-	Painted after return	
Gelada baboon <i>Theropithecus gelada</i> *	95	21 Oct. '26	Shoa
Gelada baboon <i>Theropithecus gelada</i> *	96	21 Oct. '26	Shoa
Gelada baboon <i>Theropithecus gelada</i> *	99	21 Oct. '26	Shoa
Gelada baboon <i>Theropithecus gelada</i> *	101	21 Oct. '26	Shoa
Gelada baboon <i>Theropithecus gelada</i>	102	21 Oct. '26	Shoa
Gelada baboon <i>Theropithecus gelada</i>	108	Painted after return	
Gray-headed kingfisher <i>Halcyon l. leucocephala</i>	57	7 Apr. '27	Gojjam
Greater flamingo <i>Phoenicopterus ruber antiquorum</i>	7	8 Jan. '27	Galla
Guenon monkey <i>Cercopithecus djamdjamensis</i>	93	Painted after return	
Guereza monkey <i>Colobus polykomos abyssinicus</i> *	78	Undated	Gojam?
Guereza monkey <i>Colobus polykomos abyssinicus</i> *	91	Undated	Gojjam?
Guereza monkey <i>Colobus polykomos abyssinicus</i>	106	17–18 Mar. '26	Gojjam
Guereza monkey <i>Colobus polykomos abyssinicus</i>	109	17–18 Mar. '26	Gojjam
"Hemprich's" (= Red-billed) hornbill <i>Lophoceros erythrorhynchus</i>	62	14 Jan. '27	Galla
Lesser Cape rook* <i>Corvus capensis kordofanensis</i>	67	18 Jan. '27	Galla
Long-crested hawk-eagle <i>Lophaetus occipitalis</i>	21	30 Dec. '26	Gojjam
Long-crested hawk-eagle <i>Lophaetus occipitalis</i>	22	31 Mar. '27	Gojjam
Long-tailed mongoose <i>Herpestes sanguinea</i>	107	6 Mar. '27	Gojjam
Narina trogon <i>Apaloderma n. narina</i>	56	24 Dec. '26	Sidamo
Nile helmet-shrike <i>Prionops concinnata</i>	69	6 Apr. '27	Gojjam
Northern lappet-faced vulture <i>Torgos tracheliotis nubicus</i>	31	7 Dec. '26	Bale
Northern lappet-faced vulture* <i>Torgos tracheliotis nubicus</i>	32	7 Dec. '26	Bale
Nyala <i>Tragelaphus buxtoni</i>	-	Painted after return	
Pygmy kingfisher <i>Ispidina p. picta</i>	59	10 Apr. '27	Gojjam
Red-billed ox-pecker <i>Buphagus e. erythrorhynchus</i>	70	26 Dec. '26	Sidamo
Sacred ibis <i>Threskiornis a. aethiopicus</i>	5	3 Apr. '27	Gojjam
Saddle-billed stork <i>Epihippiorhynchus senegalensis</i>	4	17 Apr. '27	Galla
Secretary bird <i>Sagittarius serpentarius</i>	11	25 Mar. '27	Gojjam
Secretary bird <i>Sagittarius serpentarius</i>	12	25 Mar. '27	Gojjam
Senegal stone curlew <i>Burhinus senegalensis</i>	49	5 Jan. '27	Galla
Senegal wattled plover <i>Afronyx s. senegallus</i>	47	5 Mar. '27	Gojjam
Silvery-cheeked hornbill <i>Bycanistes cristatus</i>	63	15 Dec. '26	Sidamo
Silvery-cheeked hornbill <i>Bycanistes cristatus</i>	64	15 Dec. '26	Sidamo
Somali greater bustard <i>Choriotis struthiunculus</i>	43	3 Jan. '27	Galla
Somali greater bustard* <i>Choriotis struthiunculus</i>	44	3 Jan. '27	Galla
Southern hooded vulture <i>Necrosyrtes monachus pileatus</i>	33	6 Mar. '27	Gojjam

Spur-winged goose <i>Plectopterus g. gambensis</i>	8	4 Apr. '27	Gojjam
Spur-winged plover <i>Hoplopterus spinosus</i>	48.2	3 Jan '27	Galla
Thick-billed raven <i>Corvultur crassirostris</i>	66	22 Oct. '26	Gojjam
Thick-billed raven* <i>Corvultur crassirostris</i>	71.3	22 Oct. '26	Gojjam
Tree cony (= hyrax) "Dendrohyrax sp." (Procavidae)	96	22 Nov. '26	Arusi
Uganda tufted guinea-fowl <i>Numida meleagris major</i>	41	31 Dec. '26	Galla
Wattled ibis <i>Bostrychia carunculata</i>	6	24 Mar. '27	Gojjam
White-backed night heron <i>Nycticorax leuconotus</i>	3	7 Apr. '27	Gojjam
White-browed coucal* <i>Centropus s. superciliosus</i>	55	5 Jan. '27	Galla
White-headed vulture <i>Trigonocephalus occipitalis</i>	33	7 Dec. '26	Bale
Unidentified insect (Hemipteran)	79	Undated	Gojjam?
Map of expedition route	-		Painted after return

* = Pencil drawings

Images Not Selected for Text Commentary

Dog-faced (Olive) baboon*	110
Gelada baboon (anatomy)*	94
Gelada baboon (anatomy)*	97
Gelada baboon (anatomy)*	98
Gelada baboon (anatomy)*	100
Galla ox*	80
Cat head (leopard?)*	86
Abyssinian native child*	84
Abyssinian horse*	82
Unidentified plant	81
Unidentified plant	83
Unidentified plant	90

* = Pencil sketches

General References

- Allen, A. A. 1927. The passing of a great teacher. *Bird-Lore*, 29:372–376.
- Anker, J. 1990. *Bird Books and Bird Art*. Maurice Martino, New York, NY.
- Bailey, A. M. 1977. With Fuertes in Abyssinia. *The Living Bird* (16th Annual Report, Cornell University Laboratory of Ornithology), pp. 103–122.
- Baum, J. 1927. *Savage Abyssinia*. J. H. Sears, New York.
- _____. 1935. *Unknown Ethiopia*. Grosset & Dunlap, New York, NY.
- Berger, C. 1994. One man's treasure. *Living Bird* 13(4):10–11.
- Boynton, M. F. 1954. Louis Agassiz Fuertes. *The Conservationist* (New York State Cons. Dept.) 7(4):10–12.
- _____. 1956. *Louis Agassiz Fuertes: His Life Briefly Told and His Correspondence Edited*. Oxford University Press, New York, NY.
- _____. 1979. Fuertes remembered. Pp. 59–64, in *Frontiers Annual*, Academy of Natural Sciences, Philadelphia, PA.
- Chapman, F. M. 1915. Louis Agassiz Fuertes: Painter of bird portraits *Bird-Lore* 17:277–284. (Reprinted from *The American Museum Journal* 15:220–224. 1915).
- _____. 1927. Louis Agassiz Fuertes 1874–1927. *Bird-Lore* 29:359–369.
- _____. 1928. In Memoriam: Louis Agassiz Fuertes 1874–1927. *Auk* 45:1–26.
- _____. 1929. *My Tropical Air Castle*. Appletons, New York, NY.
- _____. 1933. *Autobiography of a Bird Lover*. D. Appleton & Co., New York, NY.
- _____. 1937. Fuertes and Audubon: A comparison of the work and personalities of two of the world's greatest bird artists. *Natural History* 39:205–213.
- _____. 1939. Memories of Louis Fuertes. *Bird-Lore* 41:3–10.
- Coues, E. 1903. *Key to North American Birds*. Fifth ed. 2 vols. Page Co., Boston.
- Cutright, P. R., & M. J. Broadhead. 1981. *Elliott Coues, Naturalist and Frontier Historian*. University of Illinois Press, Urbana, IL.
- Devlin, J. C., & G. Naismith. 1977. *The World of Roger Tory Peterson: An Authorized Biography*. Times Books, New York, NY.
- Eaton, E. H. 1910–1914. *The Birds of New York*. 2 vols. New York State Museum, Albany, NY.
- Eckelberry, D. R. 1963. Birds in art and illustration. *The Living Bird* (2nd Annual Report, Cornell University Laboratory of Ornithology), pp. 69–82.
- Forbush, E. H. 1925–29. *Birds of Massachusetts and Other New England States*. 3 vols. Mass. Dept. of Agriculture, Boston, MA.
- Fuertes, L. A. 1913–1914. Impressions of the voices of tropical birds. *Bird Lore* 15 (1913): 341–344; 16 (1914): 1–4; 96–101; 161–169; 342–349; 421–428.
- _____. 1930. *Album of Abyssinian Birds and Mammals From Paintings by Louis Agassiz Fuertes*. Introduction by W. H. Osgood. 32 color plates. Special Publication of the Field Museum of Natural History, Chicago, IL.
- _____. & W. H. Osgood. 1936. *Artist and Naturalist in Ethiopia*. Doubleday, Doran & Co., New York, NY.
- Gilbert, A. 1984. The history of animals in art and illustration: An overview. *Zoonooz* (San Diego Zoological Society) 41(11):4–7.
- Graham, F. B. 1981. Signals from the wild: The art and science of George Miksch Sutton. *Audubon* 83(4):35–45.
- Hadley, A. H. 1931. With Fuertes in Florida. *American Forests* 37:71–73, 128.

- Hanley, W. 1977. *Natural History in America*. Quadrangle/New York Times, New York.
- Hammond, N. 1986. *Twentieth Century Wildlife Artists*. Overlook Press, New York.
- _____. 1998. *Modern Wildlife Painters*. Pica Press, Mountfield, U.K.
- Harriman, E. R. 1975. *I Reminisce*. Doubleday, Garden City, N.Y.
- Howes, P. G. 1969. *Photographer in the Rain-forests*. P. G. Howes & Assoc., Chicago.
- Kennan, G. 1922. *E. H. Harriman, A Biography*. 2 vols. Houghton Mifflin, Boston.
- Laing, H. M. 1979. *Allan Brooks: Artist Naturalist*. British Columbia Provincial Museum Special Publication No. 3, Vancouver, BC.
- Lambourne, M. 1990. *The Art of Bird Illustration*. Wellfleet, Secaucus, N.J.
- Lysaght, A. M. 1975. *The Book of Birds: Five Centuries of Book Illustrations*. Collins, London, UK.
- Marcham, F. G. 1963. Louis Agassiz Fuertes revisited. *The Living Bird* 2: 83–92.
- _____. (ed). 1971. *Louis Agassiz Fuertes and the Singular Beauty of Birds*. Harper & Row, New York, NY.
- Mearns, B., & R. Mearns. 1998. *The Bird Collectors*. Academic Press, San Diego, CA.
- Mengel, R. M. 1980. Beauty and the beast: Natural history and art. *The Living Bird* (18th Annual Report, Cornell University Laboratory of Ornithology), pp. 27–67.
- Muir, J. 1916. *Edward Henry Harriman*. Doubleday, Page, Garden City, N.Y.
- National Geographic Society. 1918. *A Book of Birds*. Natl. Geog. Soc., Washington, D.C.
- Norelli, M. R. 1975. *American Wildlife Painting*. Watson Guptill Pub., New York, NY.
- Oberholser, H. C. 1974. *The Bird Life of Texas*. 2 vols. Univ. of Texas Press, Austin, TX.
- Osgood, W. H. 1927. Louis Agassiz Fuertes. *Science* 46:469–472.
- Palmer, E. L. 1928. Louis Agassiz Fuertes. *Nature Magazine* 12:177–179.
- Pasquier, R. F., & J. Farrand. 1991. *Masterpieces of Bird Art: 700 Years of Ornithological Illustration*. Abbeville Press, New York, NY.
- Peck, R. M. 1981. *A Celebration of Birds: The Life and Art of Louis Agassiz Fuertes*. Walker, New York, NY.
- Peterson, R. T., & V. M. Peterson. 1981. *Audubon's Birds of America – The Baby Elephant Folio*. Artabras/Harrison House, New York, NY.
- Roux, F. 1996. *Les Oiseaux: Aquarelles de Louis Agassiz Fuertes*. Bibliothèque de l'Image, Paris. (64 color plates, 18 from the Abyssinian expedition)
- Sampson, J. G. 1976. *The Worlds of Ernest Thompson Seton*. Knopf, New York, NY.
- Seton, E. T. 1940. *Trails of an Artist-Naturalist*. Chas. Scribner's Sons, New York, NY.
- Skipworth, P. 1979. *The Great Bird Illustrators and their Art*. A. & W. Publ., New York, NY.
- Sterling, K. B. 1974. *Selected Works of Clinton Hart Merriam*. Arno Press, New York, NY.
- _____. 1977. *Last of the Naturalists: The Career of C. H. Merriam*. Arno Press, New York, NY.
- Sutton, G. M. 1933. Fifty years of progress in American bird art. Pp. 181–197, in *Fifty Years of Progress of American Ornithology: 1883–1933*. American Ornithologists' Union, Lancaster, Pa.
- _____. 1941. Louis Fuertes, teacher. *Audubon Magazine* 42:521–524.
- _____. 1942a. Louis Fuertes at work. *Audubon Magazine* 44:37–40.
- _____. 1942b. Fuertes and the young bird artist. *Audubon Magazine* 44:82–85.
- _____. 1962. Is bird art art? *The Living Bird* (1st. Annual Report, Cornell University Laboratory of Ornithology, Ithaca, NY), pp. 73–78.

- _____. 1979. *To a Young Bird Artist: Letters from Louis Agassiz Fuertes to George Miksch Sutton*. University of Oklahoma Press, Norman, OK.
- _____. 1980. *Bird Student: An Autobiography*. University of Texas Press, Austin, TX.
- Thayer, G. H. 1909. *Concealing-coloration in the Animal Kingdom*. Macmillan, New York, NY.
- Wells, D T. 1909. Drawing wild birds in their native haunts. A sketch of the personality and methods of Louis Agassiz Fuertes, the bird artist. *Outing Magazine* 54:565–573.

Species Account References

- Ade, B. 1979. Some observations on the breeding of the crowned plover. *Bokmakierie* 31:9–16.
- Ash, J. S. 1989. An atlas of the past and present distribution of bustards in Ethiopia and Somalia. *Bustard Studies* 4:1–34.
- _____, & J. E. Miskell. 1998. *Birds of Somalia*. Pica Press, Mountfield, Sussex, U.K.
- Attwell, R. I. G. 1966. Oxpeckers, and their association with mammals in Zambia. *Puku* 4:17–48.
- Bannerman, D. A. 1939. *The Birds of Tropical West Africa*. Vol. 5. Crown Agents for the Colonies, London, UK.
- Borghesio, L. 1997. Observations on the ecology of *Tauraco rueppellii* and *T. leucotis* in southern Ethiopia. *Bull. Brit. Orn. Club* 117:11–16.
- Brosset, A., & C. Erard. 1986. (Birds of the forested region of northeastern Gabon. Vol. 1. Ecology & behavior of the species.) *Rev. Ecol. Terre Vie* (suppl.) 3:1–289. (In French, English summary.)
- Brown, C. P. 1990. Breeding biology of the bearded vulture in southern Africa. In three parts. *Ostrich* 61:24–49.
- Brown, L. H. 1958. The breeding of the greater flamingo *Phoenicopterus ruber* at Lake Elmenteita, Kenya Colony. *Ibis* 100:388–420.
- _____. 1971. *African Birds of Prey*. Houghton Mifflin, Boston, MA.
- _____. 1972. The breeding behaviour of the African harrier hawk *Polyboroides typus* in Kenya. *Ostrich* 43:169–175.
- _____, & D. Amadon. 1968. *Eagles, Hawks and Falcons of the World*. 2 vols. McGraw Hill, New York, NY.
- _____, D. Powell-Cotton, & J. B. D. Hopcraft. 1973. The biology of the greater flamingo and great white pelican in East Africa. *Ibis* 115:352–374.
- _____, E. K. Urban & K. Newman. 1982. *The Birds of Africa*. Vol. 1. Academic Press, London, UK.
- _____, E. K. Urban & K Newman. 1997. *The Birds of Africa*. Vol. 6. Academic Press, London, UK.
- _____, E. K. Urban & K Newman. 2004. *The Birds of Africa*. Vol. 7. Academic Press, London, UK.
- Bueler, L. E. 1973. *Wild Dogs of the World*. Stein & Day, New York, NY.
- Burton, P. 1989. *Birds of Prey*. Gallery Books, New York, NY.
- Cade, T. 1982. *The Falcons of the World*. Cornell University Press, Ithaca, NY.
- Campbell, B. & E. Lack (eds.). 1985. *A Dictionary of Birds*. T. & A. D. Poyser, Calton, U.K.
- Chapin, J. 1939. The birds of the Belgian Congo. Pt. 1. *Bull. Amer. Mus. Nat. Hist.* . 65:1–756.
- _____. 1939. The birds of the Belgian Congo. Pt. 2. *Bull. Amer. Mus. Nat. Hist.* . 75:1–632.
- _____. 1953. The birds of the Belgian Congo. Pt. 3. *Bull. Amer. Mus. Nat. Hist.* . 75A:1–821.
- _____. 1954. The birds of the Belgian Congo. Pt. 4. *Bull. Amer. Mus. Nat. Hist.* . 75B:1–846.

- _____. 1963. The touracos: an African bird family. *The Living Bird* (2nd Annual Report, Cornell University Laboratory of Ornithology) 57–67.
- Clancey, P. A. 1992. *Kingfishers of Sub-Saharan Africa*. J. Ball & A. Donker, Johannesburg, South Africa.
- Clark, A. 1980. Notes on the breeding biology of the spur-winged goose. *Ostrich* 51:179–182.
- Cooper, W. T., & J. M. Forshaw. 1998. *Touracos*. Lansdowne Ed., Melbourne, Australia.
- Cramp, S., & K. E. L. Simmons. 1977. *Birds of the Western Palearctic*. Vol. 1. (Ostrich to Ducks). Oxford Univ. Press, Oxford, UK.
- _____. 1980. *Birds of the Western Palearctic*. Vol. 2. (Hawks to Bustards). Oxford Univ. Press, Oxford, UK.
- _____, & _____. 1984. *Birds of the Western Palearctic*. Vol. 3. (Waders to Gulls). Oxford Univ. Press, Oxford, UK.
- _____, & _____. 1985. *Birds of the Western Palearctic*. Vol. 4. (Hawks to Bustards). Oxford Univ. Press, Oxford, UK.
- Crook, J. H. 1966. Gelada herd structure and movement. *Symposia of the Zoological Society of London* 18:237–58.
- _____, & P. Aldrich-Blake. 1968. Ecological and behavioral contrasts between sympatric ground dwelling primates in Ethiopia. *Folia Primatologica* 8:192–227.
- Davis, A. G., & J. F. Oates (eds.). 1994. *Colobine Monkeys: Their Ecology, Behaviour and Evolution*. Cambridge University Press, Cambridge, UK.
- Dowsett, R. J., & F. Dowsett-Lemaire. 1993. *Checklist of Birds of the Afrotropical and Malagasy Regions*. Vol. 1. Species Limits and Distributions. Tauraco Press, Liège, Belgium.
- del Hoyo, J., A. Elliott & J. Sargatal (eds.). 1992–1997. *Handbook of the Birds of the World*. 4 vols. through 1997. Vol. 1 (1992) Ostrich to Ducks; Vol. 2 (1994) New World Vultures to Guineafowl; Vol. 3 (1996) Hoatzin to Auks; Vol. 4 (1997) Sandgrouse to Cuckoos. Lynx Ed., Barcelona, Spain.
- Dunbar, R. I. M. 1987. Habitat quality, population dynamics, and group composition in colobus monkeys (*Colobus guereza*). *International Journal of Primatology* 8:299–330.
- _____, & E. P. Dunbar. 1974a. Social organization and ecology of the klipspringer (*Oreotragus oreotragus*) in Ethiopia. *Zietschrift fAr Tierpsychologie* 35:481–93.
- _____, & _____. 1974b. Ecology and population dynamics of *Colobus guereza* in Ethiopia. *Folia Primatologica* 21:188–208.
- _____, & _____. 1975. Social dynamics of gelada baboons. *Contributions to Primatology* 6:1–156.
- _____, & _____. 1979. Observations on the social organization of the common duiker in Ethiopia. *African Journal of Ecology* 17:249–52.
- Estes, R. D., & D. Otte. 1990. *The Behaviour Guide to African Mammals*. University of California Press, Berkeley, CA.
- Everitt, C. 1965. Breeding the white-necked touraco. *Avic. Mag.* 71:24–7.
- Forshaw, J. M., & W. T. Cooper. 1983. *Kingfishers and Related Birds*. Vols. 1 & 2. Alcedinidae. Lansdowne Ed., Melbourne, Australia.
- _____. 1995. *Kingfishers and Related Birds*. Vols. 5 & 6. Bucerotidae. Lansdowne Ed., Melbourne, Australia.

- Fox, M. W. 1974. *The Wild Canids: Their Systematics, Behavioural Ecology, Evolution.* Van Nostrand Reinhold, New York, NY.
- Foxall, I., & P. J. K. Burton. 1975. Notes on the nesting of the white-cheeked tauraco *Turacus leucotis*. *Bull. Brit. Orn. Club* 95:27–29.
- Friedmann, H. 1930. Birds collected by the Childs Frick Expedition to Ethiopia and Kenya Colony. *Bull. U.S. Nat. Mus.* 153:1–515.
- Fry, C. H., & K. Fry. 1992. *Kingfishers, Bee-eaters & Rollers: A Handbook*. Princeton University Press, Princeton, NJ.
- _____, S. Keith & E. K. Urban (series eds.) 1982–2004. *The Birds of Africa*. 7 vols. Academic Press, London, UK.
- _____, S. Keith & E. K. Urban (eds.) 1988. *The Birds of Africa*. Vol. 3. Academic Press, London, UK.
- _____, & _____ (eds.) 2000. *The Birds of Africa*. Vol. 6. Academic Press, London, UK.
- _____, & _____ (eds.) 2004. *The Birds of Africa*. Vol. 7. Academic Press, London, UK.
- Gautier-Hion, A., et al. 1988. *A Primate Radiation: Evolutionary Biology of the African Guenons*. Cambridge University Press, Cambridge.
- Ginn, P. J., W. C. McIlleron & P. le S. Milstein, 1989. *The Complete Book of Southern African Birds*. Struik Winchester, Cape Town.
- Goodwin, D. 1970. *Pigeons and Doves of the World*. British Museum (Natural History), London, UK.
- _____. 1976 *Crows of the World*. British Museum (Natural History), London, and Cornell University Press, Ithaca, N.Y.
- Grzimek, B. (ed.) 1973. *Grzimek's Animal Life Encyclopedia*. Vols. 7–9. Birds. Vols. 10–13. Mammals. Van Nostrand Reinhold, New York & London.
- _____. 1990. *Grzimek's Encyclopedia of Mammals*. 5 vol. McGraw Hill, New York, NY.
- Grossman, M. L., & J. Hamlet. 1964. *Birds of Prey of the World*. Bonanza Books, New York, NY.
- Hall, B. P., & R. E. Moreau. 1970. *An Atlas of Speciation in African Passerine Birds*. British Museum (Natural History), London UK.
- Hancock, J. J., J. A. Kushian & M. P. Kahl. 1992. *Storks, Ibises and Spoonbills of the World*. Academic Press, London, UK.
- _____, & H. Elliott. 1978. *The Herons of the World*. Harper & Row, New York.
- Hendrichs, H. 1975. Observations on a population of Bohor reedbuck *Redunca redunca* (Pallas 1767). *Zeitschrift fÄr Tierpsychologie* 38:44–54.
- Hinton, H. E., & A. M. S. Dunn. 1967. *Mongooses: Their Natural History and Behaviour*. Oliver & Boyd, Edinburgh & London, UK.
- Hoeck, H. N., H. Klein & P. Hoeck. 1983. Flexible social organization in hyrax. *Zeitschrift fÄr Tierpsychologie* 59:265–98.
- Houston, D. C., 1976. Breeding of the white-backed and RÅppell's griffin vultures *Gyps africanus* and *G. rueppellii*. *Ibis* 118:14–40.
- Hustler, K., & W. W. Howells. 1988. Breeding biology of the white-headed vulture in Hwange National Park, Zimbabwe. *Ostrich* 59:21–4.
- Johnsgard, P. A. 1978. *Ducks, Geese and Swans of the World*. University of Nebraska Press, Lincoln, NE.

- _____. 1981. *The Plovers, Sandpipers and Snipes of the World*. University of Nebraska Press, Lincoln, NE.
- _____. 1983. *The Cranes of the World*. Indiana University Press, Bloomington, IN.
- _____. 1986. *The Quails, Partridges and Francolins of the World*. Oxford University Press, Oxford, UK.
- _____. 1991. *Bustards, Hemipodes and Sandgrouse: Birds of Dry Places*. Oxford University Press, Oxford, UK.
- _____. 2000. *Trogons and Quetzals of the World*. Smithsonian Institution Press, Washington, D.C.
- Kahl, M. P. 1973. The comparative ethology of the Ciconiidae. Part 6. The blacknecked, saddlebill and jabiru storks (genera *Xenorhynchus*, *Epihippiorhynchus* and *Jabiru*). *Condor* 75:17–27.
- Kemp, A. 1976. A study of the ecology, behaviour and systematics of *Tockus* hornbills (Aves: Bucerotidae). *Transvaal Museum Memoir*, 20:1–125.
- _____. 1995. *The Hornbills: Bucerotiformes*. Oxford Univ. Press, Oxford.
- Kingdon, J. S. 1971–82. *East African Mammals: An Atlas of Evolution in Africa*. In 7 parts. Academic Press, London, UK.
- _____. 1997. *The Kingdom Field Guide to African Mammals*. Natural World (Academic Press), San Diego, CA.
- Leuthold, W. 1977. African ungulates: A comparative review of their ethology and behavioural ecology. *Zoophysiology & Ecology* 8:1–307.
- Macdonald, D. W. (ed.). 1984. *The Encyclopedia of Mammals*. 2 vols. George, Allen & Unwin, London, UK.
- Mackworth-Praed, C. W., & C. H. B. Grant. 1960. *Birds of Eastern and North Eastern Africa*. 2nd. ed. 2 vols. Longman, London, UK.
- Maclean, G. L. 1970. The pygmy falcon. *Koedoe* 13:1–21.
- Marler, P. 1972. Vocalizations of East African monkeys. II. Black and white colobus. *Behaviour* 42:175–97.
- Marshall, C.H.T., & G. F. L. Marshall. 1988. *A Monograph of the Capitonidae, or Family of Barbets*. Fundacef, Germany.
- Mendelsohn, J. M. 1983. Social behaviour and dispersion of the blackshouldered kite. *Ostrich* 54:1–18
- _____, & Y. Leshim. 1983. Observations on reproduction and growth of Old World vultures. Pp. 214–241, in *Vulture Biology and Management* (S. R. Wilbur & J. A. Jackson, eds.), Univ. of California Press, Berkeley, CA.
- Moreau, R. E. 1933. The food of the red-billed oxpecker *Buphagus erythrorhynchus* (Stanley). *Bull. Ent. Res.* 24:325–35.
- _____. 1938. A contribution to the biology of the Musophagiformes, the so-called plantain-eaters. *Ibis* 2(4):639–71.
- _____. 1945. On the bateleur, especially at the nest. *Ibis* 87:224–49.
- _____, & W. M. Moreau. 1941. Breeding biology of the silvery-cheeked hornbills. *Auk* 58:13–27.
- Mundy, P. J., & G. Hayes. 1997. Oxpeckers and elephants. *Ostrich* 67: 85–7.
- Nagel, U. 1973. A comparison of anubis baboons, hamadryas baboons, and their hybrids at a species border in Ethiopia. *Folia Primatologica* 19:104–65.
- Newman, K. (ed.). 1971. *Birdlife in Southern Africa*. Purnell & Sons, Johannesburg, South Africa.

- North, M. E. W. 1963. Breeding of the black-headed heron at Nairobi, Kenya 1958–62. *J. East Afr. Nat. Hist. Soc.* 106:34–63.
- Nowak, R. M. (ed.). 1991. *Walker's Mammals of the World*. 5th ed. 2 vols. Johns Hopkins University Press, Baltimore.
- Oates, J. F. 1977. The social life of a black-and-white colobus monkey, *Colobus guereza*. *Zeitschrift für Tierpsychologie* 45:1–60.
- Osgood, W. H. 1928. A new genus of aquatic rodent from Abyssinia. *Publications Field Museum of Natural History*, Zoological Series 12:185–9.
- Pennycuick, C. J. 1976. Breeding of the lappet-faced and white-headed vultures *Torgos tracheliotus* and *Trigonoceps occipitalis* on Serengeti plains, Tanzania. *East African Wildlife Journal* 14:67–84.
- Root, J., & A. Root. 1969. Inside a hornbill's walled-up nest. *Nat. Geog. Mag.* 136:846–55.
- Rowan, M. K. 1963. The yellowbill duck in southern Africa. *Ostrich* suppl. 5:1–56.
- Rowell, T. E. 1971. Organization of captive groups of *Cercopithecus* monkeys. *Animal Behavior* 19:625–45.
- Rudebeck, G. 1961. Observations on the bearded vulture (*Gypaetus barbatus*) in South Africa, with notes on behaviour and field characters. In *South African Animal Life*, pp. 406–414. Almqvist & Wiksell, Stockholm, Sweden.
- Skead, C. J. 1950. A study of the African hoopoe. *Ibis* 92:435–63.
- _____. 1952. A study of the black crow *Corvus capensis*. *Ibis* 94:434–51.
- _____. 1962. A study of the crowned guineafowl *Numida meleagris coronata* Gurney. *Ostrich* 33:51–65.
- Snow, D. W. (ed.). 1978. *An Atlas of Speciation in African Non-Passerine Birds*. British Museum (Natural History), London, UK.
- Steyn, P. 1960. Observations on the African fish eagle. *Bokmakierie* 12:21–8.
- _____. 1961. Observations on the secretary bird. *African Wildlife* 15:191–98.
- _____. 1965. Some observations on the bateleur. *Ostrich* 36: 203–213.
- _____. 1970. Observations on the tawny eagle. *Ostrich* 41:1–22.
- _____. 1978. Observations on the long-crested eagle. *Bokmakierie*. 30:3–10.
- _____. 1980. Breeding and food of the bateleur in Zimbabwe (Rhodesia). *Ostrich* 51:168–78.
- _____. 1982. *Birds of Prey of Southern Africa: Their Identification and Life Histories*. David Philip, Cape Town, South Africa & Croom Helm, Beckenham, U.K.
- Struhsaker, T. 1967a. Behavior of vervet monkeys (*Cercopithecus aethiops*). *Univ. California Publications in Zoology* 82:1–74.
- _____. 1967b. Social structure among vervet monkeys. *Behaviour* 29:6–121.
- Stutterheim, C. J. 1982. Breeding biology of the red-billed oxpecker in Kruger National Park. *Ostrich* 53:79–90.
- Tarboton, W. 1989. *African Birds of Prey*. Cornell University Press, Ithaca, NY.
- _____. 1992. Aspects of breeding biology of the African jacana. *Ostrich* 63:141–57
- Taylor, M. 1975. *Herpestes sanguineus*. *Mammalian Species* 65: 1–5.
- Todd, F. 1996. *Natural History of the Waterfowl*. Ibis Press, Vista, CA.
- Urban, E. K. 1974. Breeding of sacred ibis *Threskiornis aethiopica* at Lake Shala, Ethiopia. *Ibis* 116:263–277.

- _____ & L. H. Brown. 1971. *A Checklist of the Birds of Ethiopia*. Haile Selassie University Press, Addis Ababa. (2nd ed. 1994, Ethiopian Nat. Hist. Soc., Addis Ababa, Ethiopia.)
- _____, Fry, C. H. & S. Keith. (eds.) 1986. *The Birds of Africa*. Vol. 2. Academic Press, London, UK.
- _____, _____ & _____ (eds.). 1997. *The Birds of Africa*. Vol. 5. Academic Press, London, UK.
- Ward, D. 1989. Behaviour associated with breeding of crowned, blackwinged and lesser blackwinged plovers. *Ostrich* 60:141–150. (Also see *Ostrich* 60: 49–54 & 97–102.)
- Watson, R. T. 1990. Breeding biology of the bateleur. *Ostrich* 61:13–23.
- Willmore, S. B. 1977. *Crows, Jays, Ravens and their Relatives*. David & Charles, Newton Abbot, U.K.
- Wilson, D. E., & D. M. Reeder. 1992. *Mammal Species of the World*. Smithsonian Institution Press, Washington, D.C.
- Winterbottom, J. M. 1974. The Cape teal. *Ostrich* 45:110–32.
- Wolfheim, J. 1983. *Primates of the World: Distribution, Abundance, and Conservation*. University of Washington Press, Seattle, WA.
- Yalden, D. W., M. J. Largen, & D. Kock. 1976–86. Catalogue of the mammals of Ethiopia. *Italian Journal of Zoology* 8:1–118; 9:1–52; 13:169–272; 19: 67–221; 21:31–103.
- Zimmerman, D., D. Turner & D. Pearson 1996. *Birds of Kenya and Northern Tanzania*. Christopher Helm, London, UK.

Index to Species

Note: The English and scientific names indexed here are those used in this book, but obsolete vernacular names occurring in Museum records or Fuertes' and Osgood's writings are cross-listed.

- Abyssinian brown-throated wattle-eye, *see* black-throated wattle-eye
- Abyssinian Clapperton francolin, *see* Clapperton's francolin
- Abyssinian double-toothed barbet, *see* double-toothed barbet
- Abyssinian gray plantain-eater, *see* gray plantain-eater
- Abyssinian ground hornbill, 72
- Abyssinian lanner, *see* lanner falcon
- Abyssinian pygmy falcon, *see* pygmy falcon
- Abyssinian tawny eagle, *see* tawny eagle
- Abyssinian wolf, *see* Ethiopian wolf
- Abyssinian yellow-billed duck, *see* yellow-billed duck
- Aegypius occipitalis*, 36
- Aegypius tracheliotis*, 33
- African fish eagle, 26
- African harrier hawk, 41
- African jacana , 56
- African lammergeyer, *see* lammergeier
- African little grebe, *see* little grebe
- African night heron, *see* white-backed night heron
- African pygmy kingfisher, *see* pygmy kingfisher
- African sea eagle, *see* African fish eagle
- African swallow-tailed kite, 23
- African wattled lapwing, 58
- African white-backed vulture, 33
- Anas capensis*, 20
- Anas undulata*, 21
- Apaloderma narina*, 61
- Aquila rapax*, 43
- Ardea melanocephala*, 14
- Ardeotis kori*, 54
- Banded mongoose, *see* slender mongoose
- Bateleur, 38
- Bearded vulture, *see* lammergeier
- Black kite, 24
- Black-bellied bustard, 55
- Black-headed heron, 14
- Black-shouldered kite, 22
- Black-throated wattle-eye, 77
- Bohor reedbuck , 99
- Bostrychia carunculata*, 16
- Brown-throated wattle-eye, *see* black-throated wattle-eye
- Bruce's green pigeon, 62
- Bucorvus abyssinicus*, 72

- Buphagus erythrorhynchus*. 81
Burhinus senegalensis, 57
 Bush duiker. 97
Canis semensis, 93
 Cape rook, 80
 Cape teal, 20
 Cape wigeon, *see* Cape teal
Centropus superciliosus, 66
Ceratogymna brevis, 74
Cercopithecus aethiops, 89
Ceyx picta, 69
Chelictinia riocourii, 23
 Clapperton's francolin, 52
Colobus guereza, 82
Colomys goslingi, 90
 Common crane, 53
 Common African vulture, *see* white-headed vulture
Corvus capensis, 80
Corvus crassirostris, 79
Corythornis cristata, 70
 Crested hawk-eagle, *see* long-crested hawk-eagle
 Crested hornbill, *see* silvery-cheeked hornbill
 Crested pygmy kingfisher, *see* malachite kingfisher
Crinifer zonurus, 63
 Crowned lapwing, 60
Dendrohyrax, 95
 Dog-faced baboon, *see* olive baboon
 Double-toothed barbet, 76
 Eared vulture, *see* lappet-faced vulture
 Eastern four-banded sandgrouse, *see* four-banded sandgrouse
 Eastern gray plantain-eater, 63
 Egyptian kite, *see* black kite
 Egyptian vulture, 31
Elanus caeruleus, 27
Epihippiorhynchus senegalensis, 15
Eupodotis melanogaster, 55
 Ethiopian wolf, 93
 European crane, *see* common crane
 European hoopoe, 71
Falco biarmicus, 50
 Four-banded sandgrouse, 61
Francolinus clappertoni, 52
 Galla white-cheeked plantain-eater, *see* white-cheeked turaco
 Gelada, 187
Goraschius leuconotus
 Gray plantain-eater, *see* eastern gray plantain-eater
 Gray-headed kingfisher, 68
 Greater flamingo, 18

- Grivet monkey, 89
 Guereza colobus, 82
Grus grus, 53
Gypaetus barbatus, 28
Gyps africanus, 33
Halcyon leucocephala, 68
Haliaeetus vocifer, 26
 Hamadryas baboon, 84
 Helmeted guineafowl, 51
Helotarsus ecaudatus, 37
 Hemprich's hornbill, *see* red-billed hornbill
Herpestes sanguinea, 92
 Hooded vulture, 32
 Hyrax, 95
 Klipspringer, 98
 Kori bustard, 54
 Lammergeier (or Lammergeyer), 15
 Lanner falcon, 50
 Lappet-faced vulture, 34
 Lesser Cape rook, *see* Cape rook
 Little grebe, 12
 Long-crested eagle, 45
 Long-tailed mongoose, *see* slender mongoose
Lophætus occipitalis, 45
 Lowe's sand grouse, *see* four-banded sandgrouse
Lybius bidentatus, 76
 Malachite kingfisher, 70
Megalornis grus, 53
Milvus migrans, 24
 Mountain nyala, 96
 Narina trogon, 67
Necrosyrtes monachus, 32
Neophron percnopterus, 31
Nettion capense, 20
 Nile helmet-shrike, *see* white helmet-shrike
 Northern lappet-faced vulture, *see* lappet-faced vulture
 Nyala, 96
Numida meleagris, 51
 Olive baboon, 85
Oreotragus oreotragus, 98
Papio anubis, 85
Papio hamadryas, 85
Phoenicopterus ruber, 18
Platysteira cyanea, 77
Plectropterus gambensis, 19
Polihierax semitorquatus, 49
Polyboroides typus, 41
Prionops plumatus, 78

- Pterocles quadricinctus*, 61
 Pygmy falcon, 49
 Red-billed hornbill, 73
 Red-billed oxpecker, 81
Redunca redunca, 99
 Rock hyrax, 95
 Root rat, 91
 Sacred baboon, 84
 Sacred ibis, 84
 Saddle-billed stork, 15
Sagittarius serpentarius, 47
 Secretary bird, 47
 Senegal stone curlew, *see* Senegal thick-knee
 Senegal thick-knee, 57
 Senegal wattled plover, *see* wattled lapwing
 Silvery-cheeked hornbill, 74
 Slender mongoose, 92
 Somali greater bustard, *see* kori bustard
 Southern hooded vulture, *see* hooded vulture
 Spur-winged goose, 19
 Spur-winged lapwing, 59
 Spur-winged plover, *see* spur-winged lapwing
 Swallow kite, *see* African swallow-tailed kite
Sylvicapra grimmia, 97
Tachybaptus ruficollis, 12
Tachyoryctes splendens, 91
Tauraco leucotis, 64
 Tawny eagle, 43
Terathopius ecaudatus, 38
Theropithecus gelada, 87
 Thick-billed raven, 79
Threskiornis aethiopica, 17
Tockus erythrorhynchus, 73
Tockus hemprichii, 73
Tragelaphus buxtoni, 99
 Tree hyrax, *see* hyrax
Treron waalia, 62
 Uganda tufted guinea-fowl, *see* helmeted guinea-fowl
Upupa epops, 71
Vanellus coronatus, 60
Vanellus senegallus, 58
Vanellus spinosus, 59
 Velvet rat, 96
 Water rat, *see* velvet rat
 Wattled ibis, 16
 White helmet-shrike, 78
 White-backed night heron, 13
 White-browed coucal, 66

- White-cheeked turaco, 64
White-backed vulture, 33
White-headed vulture, 36
Yellow baboon, *see* olive baboon
Yellow-billed duck, 21

Links

<http://cidc.library.cornell.edu/about/fuertes.htm>

A database with 2600 illustrations (sketches, watercolors, oils, etc.) held, hosted, and copyright © 1998 by Division of Rare & Manuscript Collections, 2B Carl A. Kroch Library, Cornell University, Ithaca, NY, 14853

http://commons.wikimedia.org/wiki/Louis_Agassiz_Fuertes

75 paintings, including 4 from *Album of Abyssinian Birds and Mammals* (1930)

<http://www.gutenberg.org/browse/authors/f#a4612>

Works by Louis Agassiz Fuertes at Project Gutenberg, including :

[Bird Stories from Burroughs](#)

[Sketches of Bird Life Taken from the Works of John Burroughs](#) (English) (as Illustrator)

[Citizen Bird](#)

[Scenes from Bird-Life in Plain English for Beginners](#) (English) (as Illustrator)

http://www.audubonart.com/02_gall_OFFU1.asp or

http://www.oppenheimereditions.com/02_gall_OFFU1.asp

20 paintings (prints for sale) from Oppenheimer Field Museum Edition.

<http://louisagassizfuertes.com/>

Warbler drawings by Louis Agassiz Fuertes from National Geographic, April 1917

<http://www.nysm.nysed.gov/virtual/collections/fuertes/index.html>

Birds of New York paintings by LAF, at the New York State Museum (shows 12 of the 118 paintings).

http://chicagofieldmuseum.net/exhibits/fuertes_tempexhib.htm

Web page for “The Painted Bird: Louis Agassiz Fuertes,” temporary exhibit September 12, 2008—January 4, 2009, The Field Museum, Chicago, IL. Shows 3 paintings and 1 photograph.



Wikimedia