

HANDBOOK OF THE BIRDS OF INDIA AND PAKISTAN

*TOGETHER WITH THOSE OF BANGLADESH,
NEPAL, BHUTAN AND SRI LANKA*

SALIM ALI
AND
S. DILLON RIPLEY

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(SE) = species extralimital (RE) = race extralimital

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A. M. HUGHES

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A. M. HUGHES

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A. M. HUGHES

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C. J. F. COOMBS

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C. J. F. COOMBS

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D. V. COWEN

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C. J. F. COOMBS

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DENNIS F. HARLE

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G. M. HENRY

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A. M. HUGHES

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- 3 *Ictyophaga nana plumbea*, Himalayan Greyheaded Fishing Eagle (177)
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A. M. HUGHES

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D. V. COWEN

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G. M. HENRY

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D. V. COWEN

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A. M. HUGHES

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- 5 *Pavo muticus spiceri*, Burmese Peafowl (312)
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PAUL BARRUEL

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- 7 *Microhierax caerulescens*, Redbreasted Falconet (204)

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G. M. HENRY

- 1 *Falco subbuteo centralasiae*, Hobby (213)
- 2 *Microhierax melanoleucus*, Whitelegged Falconet (205)
- 3 *Falco vespertinus amurensis*, Redlegged Falcon (220)
- 4 *Falco chicquera chicquera*, Redheaded Merlin (219)
- 5 *Falco biarmicus jugger*, Laggar Falcon (208)
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MONOCHROME PLATES

Birds of Prey in flight

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J. P. IRANI

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- 2 *Circus pygargus*, Montagu's Harrier (191)
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- 4 *Circus macrourus*, Pale Harrier (190)
- 5 *Milvus migrans*, Pariah Kite (133)
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- 7 *Elatomus caeruleus*, Blackwinged Kite (124)

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J. P. IRANI

- 1 *Haliaeetus leucogaster*, Whitebellied Sea Eagle (173)
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- 4 *Haliaeetus albicilla*, Whitetailed Sea Eagle (172a)
- 5 *Haliaeetus leucoryphus*, Pallas's Fishing Eagle (174)
- 6 *Aquila chrysaetos*, Golden Eagle (166)
- 7 *Hieraetus kienensi*, Rufousbellied Hawk-Eagle (165)
- 8 *Hieraetus pennatus*, Booted Hawk-Eagle (164)
- 9 *Circaetus gallicus*, Short-toed Eagle (195)
- 10 *Pandion haliaetus*, Osprey (203)
- 11 *Aquila clanga*, Greater Spotted Eagle (170)
- 12 *Hieraetus fasciatus*, Bonelli's Hawk-Eagle (163)
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J. P. IRANI

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- 4 *Buteo o vulpinus*, Desert Buzzard (155)
- 5 *Pernis ptilorhynchus rufocollaris*, Crested Honey Buzzard (130)
- 6 *Butastur teesa*, White-eyed Buzzard-Eagle (157)
- 7 *Falco subbuteo*, Hobby (212)
- 8 *Accipiter gentilis*, Goshawk (136)
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- 10 *Falco tinnunculus*, Kestrel (222)
- 11 *Falco columbarius*, Merlin (217)
- 12 *Falco peregrinus*, Peregrine Falcon (209)
- 13 *Falco p. peregrinator*, Shaheen Falcon (211)

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J. P. IRANI

- 1 *Gyps himalayensis*, Himalayan Griffon Vulture (181)
- 2 *Gyps fulvus*, Indian Griffon Vulture (180)
- 3 *Gyps indicus*, Longbilled Vulture (182)
- 4 *Gypaetus barbatus*, Bearded Vulture (188)
- 5 *Sarcogyps calvus*, King Vulture (178)
- 6 *Neophron percnopterus*, Scavenger Vulture (187)
- 7 *Gyps bengalensis*, Whitebacked Vulture (185)
- 8 *Icthyophaga ichthyaetus*, Greyheaded Fishing Eagle (175)
- 9 *Spizetus cirratus*, Crested Hawk Eagle (161)
- 10 *Spilornis cheela*, Crested Serpent Eagle (196)
- 11 *Icthyophaga naevia*, Himalayan Greyheaded Fishing Eagle (177)

INTRODUCTION

Good historical accounts of ornithology and ornithologists in India, chiefly since the beginning of the nineteenth century, and the more important contributions to the science up to the publication of the last volume of Stuart Baker in 1930 are chronicled progressively in the introductory portions of all the standard books on Indian ornithology of that period — Jerdon's *Birds of India*, and the two editions of the Fauna of British India series on *Birds*. They call for no more than a brief reference here. The first six decades of the nineteenth century, up till the publication of the former in 1862, were dominated by the virtual founders of Indian ornithology, T. C. Jerdon, Brian Hodgson and Edward Blyth; but this pioneering period was marked also by a number of other active field workers among whom deserving mention are Adams, Franklin, Hutton, McClelland, Sykes, Tickell, and Tytler in India, and Kelaart and Layard in Ceylon. *Birds of India* epitomizes the knowledge up to that date, based on the vast collections of Hodgson (chiefly from Nepal), and of Blyth and Jerdon themselves and their many protégés and correspondents, including the above named, in various parts of the Indian Peninsula. 'Jerdon' contains some excellent field notes on habits and ecology which is a refreshing feature for a period when the main accent was, understandably, on amassing large numbers of skins — often through the help of local shikaris — and classifying them. Some of these accounts, particularly relating to the rarer species, have not been added to or improved upon since, and as a whole they still remain the hard core of our knowledge of certain aspects of bird study. The book continued as the standard work on Indian ornithology for many years and is of considerable usefulness even today. Unfortunately it covers only a portion of our area, leaving out practically the whole of the present West Pakistan and Kashmir, as well as Assam, Manipur, East Pakistan, the Andaman and Nicobar islands, and Ceylon. Nevertheless the appearance of such a handy comprehensive manual embodying all the hitherto more or less scattered and region-wise information available only in learned journals — such as *Proceedings of the Zoological Society of London*, and the journals of the Linnaean and Asiatic Societies — at once gave a marked impetus to bird study. It found new devotees who in turn were soon to become prominent names in Indian ornithology. The period thence, and right up to the publication of the first edition of the government-sponsored Fauna of British India series on *Birds*¹ was completely dominated by A. O. Hume, who had meanwhile appeared on the scene. Hume,

¹ Vols. 1 (1889) and 2 (1890) by Eugene W. Oates under the editorship of W. T. Blanford, Vols. 3 (1895) and 4 (1898) by Blanford himself.

who by the way is memorable also as being one of the founders of the Indian National Congress while still in active civil service, was a truly remarkable man. He has with good justification been called 'The Father' — and as a dubious compliment by those who were sometimes irked by his seeming dogmatism 'the Pope' — of Indian ornithology. Hume collected methodically and very intensively himself and with the help of his numerous band of competent colleagues and protégés and correspondents widely scattered over the country, chiefly between about 1870 and 1885. His collection totalled over 60,000 bird skins and large numbers of nests and eggs, all of which he later presented to the British Museum, where a large part of Hodgson's Nepal collection of over 20,000 skins had already found its way. Little wonder then that, together with the other vast collections such as those of Col. Sykes, the Marquis of Tweeddale (Viscount Walden), Mr John Gould, and the many others continuously acquired since, the British Museum collection of Indian birds has come to be the most complete to be found under a single roof anywhere in the world.

Hume founded and edited '*Stray Feathers*' — *A journal of ornithology for India and dependencies* between 1872 and 1888. Its eleven volumes are a veritable gold-mine for the ornithologist and an eloquent memorial to the zeal, industry and erudition of their editor who by constant goading, advice and encouragement so ably contrived to get the best out of his tentacular band of correspondents and collaborators. The most notable of these were Anderson, Ball, Barnes, Beavan, Biddulph, Blanford, Brooks, Davison, Godwin-Austen, Hutton, Legge, Mandelli, McMaster, Oates, Scully, Sharpe, Stoliczka, Tweeddale, Vidal, Wardlaw-Ramsay, and others.

For the serious worker in Indian ornithology, *Stray Feathers* is an absolutely indispensable source. During the period of its existence this journal was the principal repository of the most important papers on Indian birds. When it ceased publication, after December 1888, many of its former contributors, as well as other workers who had gained prominence meanwhile, diverted their writings to *The Ibis* — the journal of the British Ornithologists' Union, and to the *Journal of the Bombay Natural History Society*. The last, which made its initial appearance in January 1886, has maintained unbroken publication since then. It has become increasingly important as a medium for disseminating knowledge of Indian birds and is now in its 65th volume. The *Journal* has grown progressively in international reputation and scientific stature since the turn of the century, and it is true to say that no work on Indian ornithology can be complete, or is indeed possible, without constant delving into its contents. Many significant contributions on birds have appeared in the pages of the *Journal* during the last 60 years. Even up to as recently as 1925 almost all the writers have been British — chiefly Government officials from all

branches of the services — Army, Police, Civil, Forest, and others — with a sprinkling of business and professional men. The more prominent of these have already been named in the introductory chapters of the Fauna, 2nd edition. Many of them continued to make significant contributions in the years subsequent to the completion of that work in 1930. This chronicle takes up the thread chiefly from that period on.

Bird study in India had received its second great boost by the publication between 1889 and 1898 of the four bird volumes by Eugene W. Oates and W. T. Blanford in the Fauna of British India series. As in the case of its predecessor, Jerdon's *Birds of India*, it brought together and up to date all the advances in knowledge due to the extensive work in the field and in the museum during the intervening twenty-seven years, from scattered sources including the most important — Hume's *Stray Feathers*. It took count of the areas omitted from Jerdon's manual, together with Burma, thus covering the entire British Indian Empire as it then stood, with the addition — on biological considerations — also of Ceylon. The inclusion of the extra territory increased the number of species described by more than half, and with the replacement of Jerdon's archaic nomenclature and obsolete system of classification by the more rational and progressive one that had since emerged from the anatomical researches of men like Huxley, Garrod, and Forbes, the Fauna gave a new look to Indian ornithology. It represented a marked improvement over its predecessor in every sense but one. Owing to limitations of space it was unhappily deemed fit to curtail drastically the descriptions of habits, migration etc. or omit them altogether, thus reducing very considerably the appeal and usefulness of the publication for the non-technical bird lover. This was a distinctly retrograde step.

Nevertheless the renewed fillip that the volumes gave to Indian bird study was clearly responsible for the eruption of the notable crop of outstanding field ornithologists that distinguished the next thirty-three years up to the publication of Vol. 1 of the 'New Fauna', including its author E. C. Stuart Baker himself.

A feature of the period between the two World Wars, and more particularly since the end of the Second, is the increasing popularity enjoyed by bird watching and field study as discrete from specimen collecting. This may be said to have given a new dimension to the study of Indian birds. The development and perfection of precision instruments such as field-glasses, cameras, and telephoto lenses, fast films, colour photography and sound recording have contributed not a little to this. They have helped to produce an ever-widening circle of competent bird watchers whose photographic records and penetrating observations of habits and nidification have added immensely to our knowledge, not only of the ecology but also of the systematics of Indian birds.

Thus, one of the more refreshing features of the 2nd edition of the Fauna by Stuart Baker (the 'New Fauna' for short) is the section on habits under each bird, in addition to fuller notes on nidification than in its predecessor. To Baker must also go the credit for introducing trinomials, officially as it were, into Indian ornithology although this system had been increasingly in vogue in Europe for almost two decades previously, and especially since the publication of Ernst Hartert's great work *Die Vögel der paläarktischen Fauna* began in 1910.

With the innovation of trinomials in Indian ornithology, a certain amount of disagreement and conflict of opinion was inevitable among ornithologists who had concerned themselves specially with its related problems; and indeed controversies have not ceased forty years after its introduction. No sooner was the first volume of the New Fauna published (in 1922) than the criticisms and arguments began. Whistler and Ticehurst in particular joined issue with Baker on a number of his statements and dicta. Many of their objections derived from the fact that large tracts of the country had as yet not been sufficiently explored ornithologically and there remained considerable gaps in our knowledge of the geographical distribution of many 'resident' birds — knowledge which is crucial for a proper application of the subspecies concept.

Nevertheless it must be conceded that by and large the New Fauna represented a distinct advance on its predecessors, though here and there it might suffer from obvious defects and inaccuracies of fact and geography. Among the many workers on Indian birds prominent during the period between the two World Wars (c. 1917 to 1943), and the years that followed, perhaps the most significant were E. C. Stuart Baker, Hugh Whistler, Dr Claud B. Ticehurst, Sir Norman Kinnear, Frank Ludlow, B. B. Osmaston, A. E. Jones, Charles M. Inglis, Sálim Ali, W. W. A. Phillips, R. S. P. Bates, and E. H. N. Lowther.

Besides these there are numerous others who made important contributions to Indian ornithology and whose names constantly recur in the *Journal of the Bombay Natural History Society* and other scientific periodicals. Foremost among them all must certainly rank Hugh Whistler, who had not only collected birds diligently during his seventeen years in the Imperial Police Service in the Punjab, but also amassed copious notes on every aspect of Indian bird life. These data were intended for a handbook of Indian birds which he and his close friend and collaborator Dr Ticehurst had commenced to write jointly. It was indeed a tragic blow for Indian ornithology when both these men — two of the most meticulous workers we have ever had — died before the manuscript had made much progress, Ticehurst in 1941 and Whistler in 1943.¹ A portion of Whistler's manuscript notes and

¹ Obituaries CBT, *Ibis* 1941: 321; HW, *Ibis* 1943: 524.

files, relating particularly to the Passeres, passed into the hands of one of us (SA) through the friendly offices of the Honourable Mrs Joan Whistler. This material will be of the greatest usefulness when that section of the present *Handbook* is reached. It has proved invaluable to the second author (SDR) in the preparation of his *Synopsis* which forms the groundwork of this book.

It was in order to rectify the deficiencies in our knowledge, chiefly of geographical distribution within the country pin-pointed by the publication of the new Fauna, that, at the instigation of Whistler, the Bombay Natural History Society with the financial sponsorship of Mr Arthur Vernay — an American business magnate and patron of Natural History — undertook, in 1929, a well-planned survey of the birds of the Eastern Ghats, at that time one of the least known areas in the Peninsula. The extensive survey collections, most excellently prepared by V. S. Lapersonne, the Society's field collector, were studied in England by Messrs Whistler and Kinnear with the collaboration of Dr Ticehurst. The scientific report of the Eastern Ghats Survey, in sixteen parts spread over several volumes of the *Journal* of the Bombay Natural History Society, graphically highlighted the gaps in our knowledge and supplied the incentive for a series of similar investigations in other poorly known parts of the country. These later surveys covered Jodhpur, Hyderabad, Travancore, Cochin, Gwalior, Indore, Bhopal, Mysore, Bahawalpur, Gujarat, Kutch, Bastar and Kankar (eastern Madhya Pradesh), and Orissa, in that order. All the field work, except in Jodhpur, was carried out by Sálim Ali chiefly with funds donated by the rulers of the States concerned and others, and supplemented from his own resources — and in close liaison with Hugh Whistler up to the time of the latter's death. The then newly introduced air mail service between India and the U.K. enabled running contact to be maintained from the field, and the rapid exchanges proved invaluable in the elucidation of many problems that required prompt collection of material and ancillary data. This close coordination between field and museum greatly enhanced the scientific worth of the surveys. Besides, Sálim Ali being more particularly interested in the living bird, devoted special attention to ecology and habits, and was able to accumulate a considerable amount of new data on these aspects in the course of his field work, adding substantially to what was recorded before. The late Dato Loke Wan Tho of Malaya, an exceptionally keen ornithologist and generous patron of ornithology, financed a bird survey of Sikkim during three separate field seasons between 1955 and 1957. The field work was again carried out by Sálim Ali, once with the active participation of Loke himself, and resulted in the publication by the former of the book *Birds of Sikkim* (1962). A few years earlier, in 1948, Loke had also made it financially possible for Sálim Ali to undertake a joint ornithological expedition to

the Mishmi Hills of north-east Assam (now Luhit Frontier Division, NEFA) with S. Dillon Ripley, the results of which were reported in the JBNHS (1948, 48: 1-37). Incidentally it was on the Mishmi expedition that the idea of the present Handbook was first mooted between the authors. All these newly accumulated data soon made it plain that Stuart Baker's Fauna left much room for correction, addition and improvement in many respects, and emphasized the need for an early revision. Added to all the wealth of material procured by these regional bird surveys, mention must be made of the very fruitful collecting expeditions of Ripley himself in Nepal, and the Naga Hills of Assam (now Nagaland), during the post-war years. Further, during the war period Ripley had found opportunities for selective collecting in Ceylon while on duty with the American armed forces in that island, thus supplementing the excellent work zealously carried on there by W. W. A. Phillips over a long series of years. A major contribution to bird collections from India was made by another American, Walter Koelz, during an extended sojourn of some fourteen years (*c.* 1939-53) in the subcontinent and neighbouring countries. While collecting specimens of grains on behalf of the U.S. Department of Agriculture, he managed also to amass a stupendous collection of some 40,000 bird skins — partly in Iran and Afghanistan, but mainly in Pakistan, Nepal, Assam, and various other insufficiently worked areas of the Indian Subregion. Koelz was an indefatigable field collector. By dint of unsparring effort and fanatical industry he managed to procure large series of many birds poorly represented even in the foremost world collections, including some of the rarest forms. Unfortunately he does not seem to have kept field notes on habits, ecology, etc. He certainly never published any, nor have we been privileged to see them in MS. — thus depriving Indian ornithology of what could undoubtedly have been his greatest contribution to it. Unfortunately also the vast Koelz collection was broken up and dispersed among a number of museums in the U.S.A., a circumstance which has deprived students of the convenience of having all this material available for study in one central institution.

* * * *

The standard manuals of ornithology mentioned earlier were excellent in their own way, but they presumed a basic familiarity with birds and were difficult to use by the uninitiated layman. Besides, it was widely realized that now — over thirty years since their publication — Stuart Baker's Fauna volumes were outmoded in many respects and stood in urgent need of revision. What was obviously needed at this stage was not merely the Fauna in its old format brought up to date, but a work which combined strict scientific accuracy with non-technical language and popular appeal — concise accounts of life history and habits and,

above all, good coloured illustrations supplemented by simple clues to field identification. Since the change in the political set-up in India (in 1947) and the departure of British officials, among whom were to be found some of the keenest and most knowledgeable bird-watchers, field activity suffered a noticeable setback. A serious impediment to the development of scientific ornithology in India, where bird-watching as a hobby has never been very popular even among the more affluent and educated classes, was certainly the lack of illustrated literature on the birds of the country. The stimulus given to purposeful bird-watching as a first step to deeper study by the publication in recent years of illustrated books like Whistler's *Popular Handbook of Indian Birds* and Sálim Ali's *Book of Indian Birds* clearly pointed to the need of a more comprehensive work on the same lines.

Our inspiration was derived from the admirable *Handbook of British Birds* by Witherby and others, which combines all the desired features in a manner that has seldom been excelled. But though our book is so entitled as a tribute to its British original, we are only too conscious of the loss it suffers by comparison since our information on most topics of the life history and ecology of Indian birds — even of distribution — is as yet quite elementary compared with that in the British handbook. Nevertheless it seems desirable to record whatever is known if only to show the extent of its incompleteness, so that the deficiencies may in time be rectified.

The first essential, before a beginning with such a book could be made, was an up-to-date checklist as basis for the descriptive volumes to follow, a need admirably fulfilled by Ripley's *A Synopsis of the Birds of India and Pakistan* published by the Bombay Natural History Society in 1961. It lists some 1,200 species in nearly 2,100 forms within the above limits, with which is also included Ceylon from biological considerations.

In the past the greater part of the ornithological work in India consisted of specimen or egg collecting, sometimes rather haphazardly. Within recent years these activities have been increasingly replaced by bird-watching at various levels of scientific competence. Most of the observers have been government officials or tea, coffee or rubber planters, fortuitously stationed for varying periods in different parts of the country. Few of them possessed any formal biological background, and though a number contributed substantially to our knowledge such were, for the size of the country, too few and far between. For us — the present authors — difficulty lay in assessing the authenticity of the distributional and other records by observers of unproved competence in field identification especially where they rested solely on sight, or related to topics of a controversial nature. There is no doubt that in the past many unwarranted records and observations have been uncritically accepted in this way. The need

for caution has doubled in recent years because of the expanding circle of casual bird-watchers of vastly divergent expertness, and the decline in the vogue of shooting specimens to support identification. Thus it is possible that in exercising our judgement in this regard we may sometimes have erred on the side of overcaution.

Even after suitable compression of the available data, meagre as they are on the whole, a coverage of this magnitude is estimated to require 10 volumes of approximately 400 pages each, and many years to complete. Such a work must inevitably be a compilation to a large extent, collating our own notes with the sifted publications and MSS. of a large number of field observers and museum workers. In view of the coloured illustrations, 'feather by feather' descriptions of plumages, as in the Fauna, were considered redundant. The pictures, supplemented by the Keys and the paragraphs on Field Characters and Museum Diagnosis, should suffice to identify a bird in the field as well as in the hand.

The New Fauna has already listed active workers in Indian ornithology up to the time of its completion in 1930; that account now merely needs carrying forward to the publication of the present volume. In addition to the persons named below there are others who have made minor but significant contributions and who will appear in the text. During the progress of these volumes it is hoped that further names will also need to be added. The major continuing contributors as well as new ones since the completion of the second edition of the Fauna have been Humayun Abdulali, Sálim Ali, E. C. Stuart Baker, R. S. P. Bates, F. N. Betts, Biswamoy Biswas, F. S. Briggs, P. T. L. Dodsworth, E. A. D'Abreu, R. S. Dharmakumarsinhji, C. H. Donald, K. R. Eates, R. L. Fleming (Sr.), J. C. Higgins, Charles M. Inglis, A. E. Jones, N. B. Kinnear, Walter Koelz, Satya Churn Law, Loke Wan Tho, E. H. N. Lowther, Frank Ludlow, R. Meinertzhagen, B. B. Osmaston, W. W. A. Phillips, Mrs Desirée Proud, S. Dillon Ripley, Claud B. Ticehurst, H. W. Waite and Hugh Whistler. Foremost among those active in Burma up to the time of its fall to the Japanese invaders in the war (1941) were P. F. Garthwaite, T. R. Livesey, H. C. Smith, B. E. Smythies, and J. K. Stanford. Since the end of hostilities little work seems to have been done in that country, or since the partition (1947) in Pakistan.

ACKNOWLEDGEMENTS

To all the above and the many more on whom we have drawn freely we feel greatly beholden. Particular mention must be made of Dr Biswamoy Biswas who has been associated with the preparation of the MS. in various ways and whose critical comments and suggestions on various matters have always been most valuable.

We have to express our indebtedness to the National Institute of Sciences of India and its then President, the late Dr Sunder Lal Hora, for the award of a Research Fellowship to one of us (SA) for two years (1952-3) to forward the extraction of relevant material from the literature. The Bombay Natural History Society, under whose sponsorship this book is being produced, has provided facilities at every stage, especially the use of its excellent collection of Indian bird skins and ornithological library. We wish to express our appreciation of the unfailing cooperation we have received from its staff at all times.

Without the substantial grant-in-aid from the Government of India, Ministry of Scientific Research, for the preparation of the four-colour blocks, and for secretarial assistance to one of us (SA) in preparing the MS., it is doubtful if such an ambitious project could have been entertained or carried through. Likewise would it have been impossible to find the foreign exchange needed for payment of the artists' fees, since most of these are of necessity European, but for the generous underwriting by friends in the United States of America of the substantial amount needed for the purpose.

The dichotomous keys to genera, species, and subspecies have been constructed by one of us (SDR) with the most valuable aid of his research assistant Mr Gorman M. Bond, Museum Specialist of the Smithsonian Institution, Washington, to whom warm thanks are due. We are indebted to Mr Bertram E. Smythies and Messrs Oliver & Boyd Ltd, the author and publishers respectively of *The Birds of Burma*, for their generous permission to use a number of the coloured plates painted for that book by Commander A. M. Hughes. A few of the figures on these depict a different subspecies to that found within Indian limits, but the differences are mostly minor enough to be reconciled by a short verbal correction. We have been similarly privileged to use the coloured plates from *The Birds of Travancore and Cochin* (now *Birds of Kerala*) and *The Birds of Sikkim* by courtesy of the sponsors of those books, the University of Kerala and the Government of Sikkim respectively, and of the publishers, the Oxford University Press.

Most of the line drawings in the text are the same as appeared in the first edition of the *Fauna of British India: Birds*, and again in the second edition of that work by E. C. Stuart Baker (Taylor & Francis, for the Government of India). In addition, Messrs H. F. & G. Witherby have generously permitted us to reproduce some of the very useful text figures from their *Handbook of British Birds*. All this considerate cooperation has not only helped to cut down costs, especially of painting the extra coloured plates and block-making, but also resulted in a considerable saving of time.

The distribution maps have been constructed or adapted from a number of different sources the chief of which are *Atlas of European*

Birds by K. H. Voous (Nelson), *Waterfowl of the World* by Jean Delacour (Country Life), and *Birds of the Soviet Union* by G. P. Dementiev, H. Gladkov *et al.*

Lastly, our particular and grateful appreciation is due to the staff of the Oxford University Press. But for their running bombardment of queries and suggestions many more inaccuracies, inconsistencies and ambiguities would have persisted in this volume than the reader is perhaps still likely to discover.

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GENERAL

ORNITHOLOGISTS conditioned to the sequence of Orders and Families in Stuart Baker's Fauna volumes may experience some initial inconvenience and confusion by the arrangement in the present handbook. In the main this represents the scheme proposed by Wetmore (*Proc. U.S. Nat. Museum*, 76, Art. 24, 1930, pp. 1-8) now used more or less internationally with minor shufflings chiefly in the Passeriform ('Song bird') families. This system was formally introduced into Indian ornithology by the publication in 1961 of *A Synopsis of the Birds of India and Pakistan* by S. Dillon Ripley, our latest authentic checklist, which virtually forms the index volume and basis of the present work. Superficially this system is little more than the old one in reverse. Whereas the Fauna began with the Order Passeriformes as containing the putatively highest developed forms and worked down to the lowest, namely to the Gaviiformes (Loons and Divers), we now begin at the bottom of the evolutionary tree and work up to the highest evolved forms.

The sequence of Orders and Families followed in the second edition of Vol. 1 and the first editions of Vols. 2-10 is as under. Some taxonomic changes in Vols. 2-10 will follow publication of the second edition of the *Synopsis*.

Volume 1 (Nos. 1-224)

Order GAVIIFORMES

Family Gaviidae : Divers, Loons

Order PODICIPITIFORMES

Family Podicipedidae : Grebes

Order PROCELLARIIFORMES

Family Procellariidae : Petrels, Shearwaters

Hydrobatidae : Storm Petrels

Order PELECANIFORMES

Family Phaethontidae : Tropic-birds

Pelecanidae : Pelicans

Sulidae : Boobies

Phalacrocoracidae : Cormorants and Darter

Fregatidae : Frigate Birds

Order CICONIIFORMES

Family Ardeidae : Herons, Egrets, Bitterns

Ciconiidae : Storks

Threskiornithidae : Ibises, Spoonbill

Phoenicopteridae : Flamingos

Order ANSERIFORMES

Family Anatidae : Ducks, Geese, Swans

Order FALCONIFORMES

Family Accipitridae : Hawks, Vultures, etc.

Falconidae : Falcons

Volume 2 (Nos. 225-434)**Order GALLIFORMES**

Family Megapodiidae: Megapodes

Phasianidae: Pheasants, Partridges, Quails

Order GRUIFORMES

Family Turnicidae: Bustard-Quails

Gruidae: Cranes

Rallidae: Rails, Coots

Heliornithidae: Finfoots

Otididae: Bustards

Order CHARADRIIFORMES

Family Jaçanidae: Jaçanas

Haematopodidae: Oystercatchers

Charadriidae:

Subfamily Charadriinae: Plovers

Scolopacinae: Curlews, Sandpipers, Snipe, Woodcock

Phalaropinae: Phalaropes

Family Rostratulidae: Painted Snipe

Recurvirostridae: Stilts, Avocets, Ibisbills

Dromadidae: Crab Plovers

Volume 3 (Nos. 435-665)

Family Burhinidae: Stone Curlews, Thick-knees

Glareolidae: Coursers, Pratincoles

Stercorariidae: Skuas, Jaegers

Laridae: Gulls, Terns

Order COLUMBIFORMES

Family Pteroclididae: Sandgrouse

Columbidae: Pigeons, Doves

Order PSITTACIFORMES

Family Psittacidae: Parrots

Order CUCULIFORMES

Family Cuculidae: Cuckoos

Order STRIGIFORMES

Family Strigidae:

Subfamily Tytoninae: Barn Owls

Striginae: Owls

Volume 4 (Nos. 666-871)**Order CAPRIMULGIFORMES**

Family Podargidae: Frogmouths

Caprimulgidae: Nightjars or Goatsuckers

Order APODIFORMES

Family Apodidae:

Coraciidae: Rollers or Blue Jays

Hemiprocninae: Crested Swifts

Order TROGONIFORMES

Family Trogonidae: Trogons

Order CORACIIFORMES

Family Alcedinidae: Kingfishers

Picidae: Subfamily Jynginae: Wrynecks

Picumninae: Piculets

Picidae: Woodpeckers

Coraciidae: Rollers

Upupidae: Hoopoes

Bucerotidae: Hornbills

Order PICIFORMES

Family Capitonidae: Barbets

Indicatoridae: Honeyguides

Picidae: Woodpeckers

Order PASSERIFORMES

Family Eurylaimidae: Broadbills

Pittidae: Pittas

Volume 5 (Nos. 872-1063)

Family Alaudidae: Larks

Hirundinidae: Swallows

Laniidae: Shrikes or 'Butcher Birds'

Oriolidae: Orioles

Dicruridae: Drongos

Artamidae: Swallow-Shrikes or Wood Swallows

Sturnidae: Starlings, Mynas

Corvidae: Crows, Magpies, Jays, etc.

Bombycillidae:

Subfamily Bombycillinae: Waxwings

Hypocoliinae: Hypocolius

Volume 6 (Nos. 1064-1271)

Family Campephagidae: Cuckoo-Shrikes, Minivets

Irenidae: Fairy Bluebirds, Ioras, Leaf Birds

Pycnonotidae: Bulbuls

Muscicapidae:

Subfamily Timaliinae: Babblers (part)

Volume 7 (Nos. 1272-1470)

Family Muscicapidae (cont.):

Subfamily Timaliinae: Babblers (cont.)

Muscicapinae: Flycatchers

Pachycephalinae: Thickheads or Shrikebilled Flycatchers

Volume 8 (Nos. 1471-1680)

Family Muscicapidae (cont.):

Subfamily Sylviinae: Warblers

Turdinae: Thrushes, Robins, Chats

Volume 9 (Nos. 1681-1891)

Subfamily Turdinae: Thrushes, Robins, Chats (cont.)

Family Troglodytidae: Wrens

Family Cinclidae: Dippers

Prunellidae: Accentors or 'Hedge Sparrows'

Paridae:

Subfamily Parinae: True Tits

Remizinae: Penduline Titmice

Aegithalinae: Longtailed Titmice

Family Sittidae:

Subfamily Sittinae: Nuthatches

Tichodromadinae: Wall Creepers

Salpornitinae: Spotted Creepers

Family Certhiidae: Tree Creepers

Motacillidae: Pipits, Wagtails

Volume 10 (Nos. 1892-2060)

Family Dicaeidae: Flowerpeckers

Nectariniidae: Sunbirds, Spiderhunters

Zosteropidae: White-eyes

Ploceidae:

Subfamily Passerinae: House and Rock Sparrows

Ploceinae: Weaver Birds or Bayas

Estrildinae: Munias

Family Fringillidae:

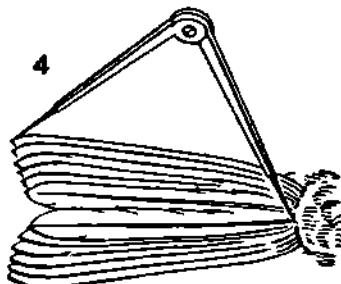
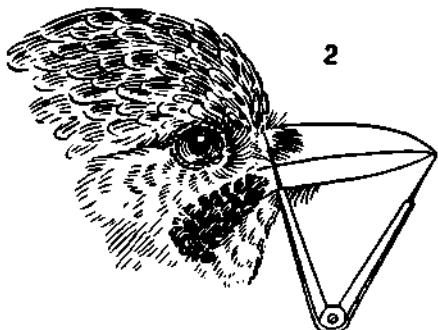
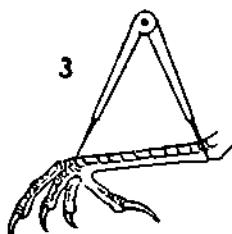
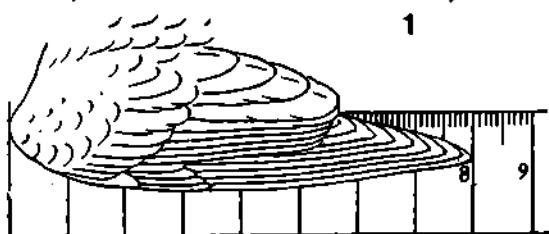
Subfamily Fringillinae: Chaffinches

Carduelinae: Goldfinches and allies

Family Emberizidae: Buntings

Measurements. At the head of each description, before FIELD CHARACTERS, is given an indication of size, first as compared with some well-known and familiar bird (the signs + and - denoting larger or smaller than, and ± more or less equal to), and then by length in centimetres and inches. This refers to the length from tip of bill to tip of tail of a freshly killed bird laid on its back, unstretched, or of a similarly made up museum skin. This measure is purely as a matter of convenience in field identification since it is easy enough for anyone to hold his two hands apart and visualize what 'about 15 cm. or 6 inches' means. It has no scientific value.

Under MUSEUM DIAGNOSIS the measurements given for wing, bill, tarsus, and tail are those taken by the standard methods as shown in



STANDARD METHOD OF MEASURING BIRDS

- 1 Wing** Pressed out on the rule until it is quite flat, giving the longest measurement obtainable. For very large birds (e.g. eagles and swans), a measuring tape is stretched from the carpal joint to the longest feather along the upper side of the wing. This is known as the chord measurement.
- 2 Bill** From skull. One end of the dividers is slid along the culmen and pressed to the skull, which is usually concealed by feathers. This gives a more consistent measurement than from the end of feathering to the tip ('culmen' or 'bill from feathers').
- 3 Tarsus** One end of the dividers is pressed to the tibiotarsal or 'knee' joint, the other passed to the joint at the base of the middle toe.
- 4 Tail** One end of the dividers is slid between the central tail feathers and pressed to the body while the other is passed to the tip of the longest feather.

the Explanatory Figures. It must be mentioned, however, that in all of Stuart Baker's measurements quoted from the Fauna, the bill has been measured from the *forehead feathers* to the tip (i.e. culmen), and not from the *skull* as is now the accepted practice. Wing measurement in particular can be more satisfactorily taken in the flesh — either on a freshly killed bird or a living one — while the joints are still

flexible and easy to manipulate. There is some slight shrinkage on drying which can largely be compensated for by not pressing and straightening out the fresh wing on the rule too much (as when measuring a dry skin) but merely leaving it in a fully extended natural position. This precaution is necessary in order to make the wing comparable with dry museum skins later.

Weight. Field collectors have paid little attention to this detail in the past except perhaps in the case of some game birds. Apart from being a record of sexual differences in many species, fluctuations in weight due to seasonal physiological changes and deposition of body fat have an important bearing for the study of bird migration; therefore, wherever possible weights should be accurately recorded. With small birds like most passerines this is easily done by slipping the bird, dead or alive, into a plastic bag and hooking it on to a suitable spring balance, the tare having been previously ascertained. With large live birds some device to prevent them from fluttering during weighment is necessary.

NOTE. Much of our information relating to nesting has been culled from Stuart Baker, either from FBI or from his *Nidification of Birds of the Indian Empire*. Though these are authentic sources by and large, it needs to be emphasized that some of this author's data concerning clutch sizes, and even his identifications of certain eggs, are suspect or demonstrably erroneous. Baker, although an experienced oologist himself, often collected his eggs and information vicariously with the help of local shikaris and hired jungle people, or purchased them in lots from minor professional collectors whose testimony was not always dependable. Therefore any of his published data that differ widely from those of other workers or from personal experience must be treated with caution since they are more than likely to have been vitiated in this manner. Every effort has here been made to weed out all palpably doubtful records.

MIGRATION

THE 2100 odd species and subspecies of birds that comprise the avifauna of the Indian subcontinent and Ceylon include land birds as well as pelagic forms such as petrels, shearwaters, frigate birds, boobies, and skuas normally found only out at sea but which get blown in sporadically on our seaboard during heavy monsoon gales. Roughly about 350 forms are extralimital seasonal immigrants, meaning that they breed outside our territory, mostly in the Palaearctic Region beyond the Himalayas — in central and northern Asia, and eastern and northern Europe. The most abundant and regular winter migrants are the ducks and geese (Anatidae), Wading or Shore birds (Charadriidae) especially of the subfamilies Charadriinae and Scolopacinae, Cranes (Gruidae), and the passerine families Hirundinidae (Swallows), Muscicapidae especially Muscicapinae (Flycatchers), Sylvinae (Warblers), Turdinae (Thrushes and Chats), Motacillidae (Pipits and Wagtails), Fringillidae (Finches), and Emberizidae (Buntings). But many other families are represented among the migrants as well. Moreover, every gradation of migration is met with, from local movements of no more than a few kilometres, or a few hundred metres altitudinally in the Himalayas or peninsular mountains, to enormous trans-Himalayan journeys involving several thousand kilometres each way.

Besides the large number of extralimital migrants, there are numerous others whose palaearctic breeding range just encroaches our boundaries on the Afghanistan-West Pakistan border, and also into Gilgit, Ladakh, Garhwal, Nepal, Sikkim, Bhutan, and NE. Assam. Many of these species spread over northern India in winter, and many over the rest of the Peninsula as well. In all respects they behave like the true migrants from beyond, arriving with them and spreading out over the country in autumn, chiefly between September and November, and leaving again for their northern breeding grounds before our hot weather commences in March/April. Considering the hundreds of species and the millions of individuals involved in these biannual journeys, year after year, it is amazing how little precise information we possess concerning the provenance, routes and goals, and other factual details of the migrants. Practically all that is known is based on somewhat scrappy and haphazard observations, chiefly of British army and civil service personnel who happened to be stationed along the strategic Indo-Afghan border within the last 100 years. Some of these men were excellent field naturalists and have contributed vastly to our basic knowledge of Indian ornithology. The names of Scully, Biddulph, the two Marshall brothers, Magrath, Whitehead

and Donald stand out from amongst the many others in this connexion. Their observational data, though primarily relating to sporting birds such as ducks, geese, and cranes, form the hard core of practically all that is known of trans-Himalayan bird migration. They outlined the broad pattern of the seasonal movements and indicated that the main migration route between Siberia and central Asia on the one hand and the Indian peninsula on the other was the Indus Valley in the northwest. Similar though even more fragmentary bits of information from the northeastern outposts of India suggest that from NE. Asia the Tsango or Brahmaputra river and its affluents constitute the principal flyway. The two migrational streams enter from either end of the Himalayan mountain chain in a pincer movement and converge on the tip of the Peninsula, weakening as they advance southward and trickle over into Ceylon which virtually forms the terminus. However, increasing evidence is being procured by mountaineers in recent years that migrants also fly directly across the Himalayas, even over some of the highest sections of the mountain barrier, thereby in effect shortening their journeys very considerably. Not only have many migrating geese, waders and passerine birds been visually recorded during daytime¹ and heard passing over the high altitude camps at night, but climbers have also come across remains of migratory birds such as ducks, cranes, waders, and eagles² strewn on high glaciers in the Himalayas and Karakorams which had evidently perished in storms and blizzards. At Dehra Dun geese have been observed through a telescope flying northward in spring at a height of c. 29,500 feet (8830 m.) across the face of the moon. Indeed there is now sufficient evidence of this kind to suggest that a far greater amount of passage must take place directly over the High Himalayas than had hitherto been credited. Recent migration studies by radar in Europe and America have shown that, contrary to older beliefs, even small passerine birds may travel at unsuspected heights of 6000 metres or more, which lends colour to this probability. Nevertheless it is true that a large proportion of the migratory birds, especially ducks and geese, that enter the subcontinent from the northwest in autumn — when the journey is more leisurely performed — sweep down the valley of the Indus river. One arm of the migrational tide branches off early in a SE. direction and debouches into the north Indian plains through Hazara, Kashmir, and the Punjab. The Kagan and Kurram Valleys on the northwest frontier of Pakistan have been specifically named in this connexion (Whitehead, Magrath). The other arm continues southward down the Indus and, avoiding the inhospitable expanse

¹ Biswas reports seeing a stray hoopoe (*Upupa epops*) on Pumori Glacier, c. 5790 m., in May.

² Blacktailed Godwit (*Limosa limosa*) and Pintail Duck (*Anas acuta*) on Khumbu Glacier c. 16,000 ft. (4875 m.) at the foot of Mt Everest, and Steppe Eagles (*Aquila nipalensis*) on South Col, c. 26,000 ft. (7925 m.).

of the Thar or Indian Desert to the east, veers further south in a south-easterly direction to cross the Great Rann of Kutch, northern Gujarat and Saurashtra and enter the Indian peninsula. This stream is augmented in its course by migrants travelling SSE. from W. Asia — from the Caspian-Aral region through Iran, Afghanistan, Baluchistan, and Lower Sind. This, in broad outline, is the general picture that emerges from a consideration of the data available. But it is largely conjectural and hypothetical and needs verifying by more intensive studies. There is reason to believe that for many species the pattern of the spring migration, which is usually more hurried and direct, with fewer stopovers and also at higher altitudes, is very different. Kutch also lies on the extreme eastern fringe of a broad stream of through migration that sweeps down from central and northern Asia in a southwesterly direction in autumn. This current passes over Afghanistan and the former NW. Frontier Province, down through Baluchistan and Sind, then across the Arabian Sea and the tip of southern Arabia into Somalia, Abyssinia, and further south in the African continent. Such species as the Kashmir Roller (*Coracias garrulus semenowi*), European Nightjar (*Caprimulgus europaeus unwini*), European and Bluecheeked Bee-eaters (*Merops apiaster* and *M. s. persicus*), Redbacked Shrike (*Lanius collurio*), Rock Thrush (*Monticola saxatilis*), Greybacked Chat (*Erythropygia galactotes familiaris*), Indian Whitethroat (*Sylvia communis icterops*), Spotted Flycatcher (*Muscicapa striata neumannii*), and others, travel regularly by this route. From the absence of Indian records on spring passage it is evident that most of them, at any rate, take a different route for the return journey north.

Far less is known about bird migration across our northeastern frontiers. This is largely due to the uninhabited, rugged and mostly inaccessible nature of the terrain in the eastern Himalayas, and to the fact of this frontier having been considered of too little strategic importance in the past to necessitate the stationing of British military personnel such as have provided most of our data for the northwest. The recent Chinese incursions in that quarter have dictated greater vigilance and logistic developments, and with the opening up of the North-east Frontier Agency tracts (NEFA) to 'civilizing' influences it is to be hoped that our knowledge of bird migration in that area will profit.

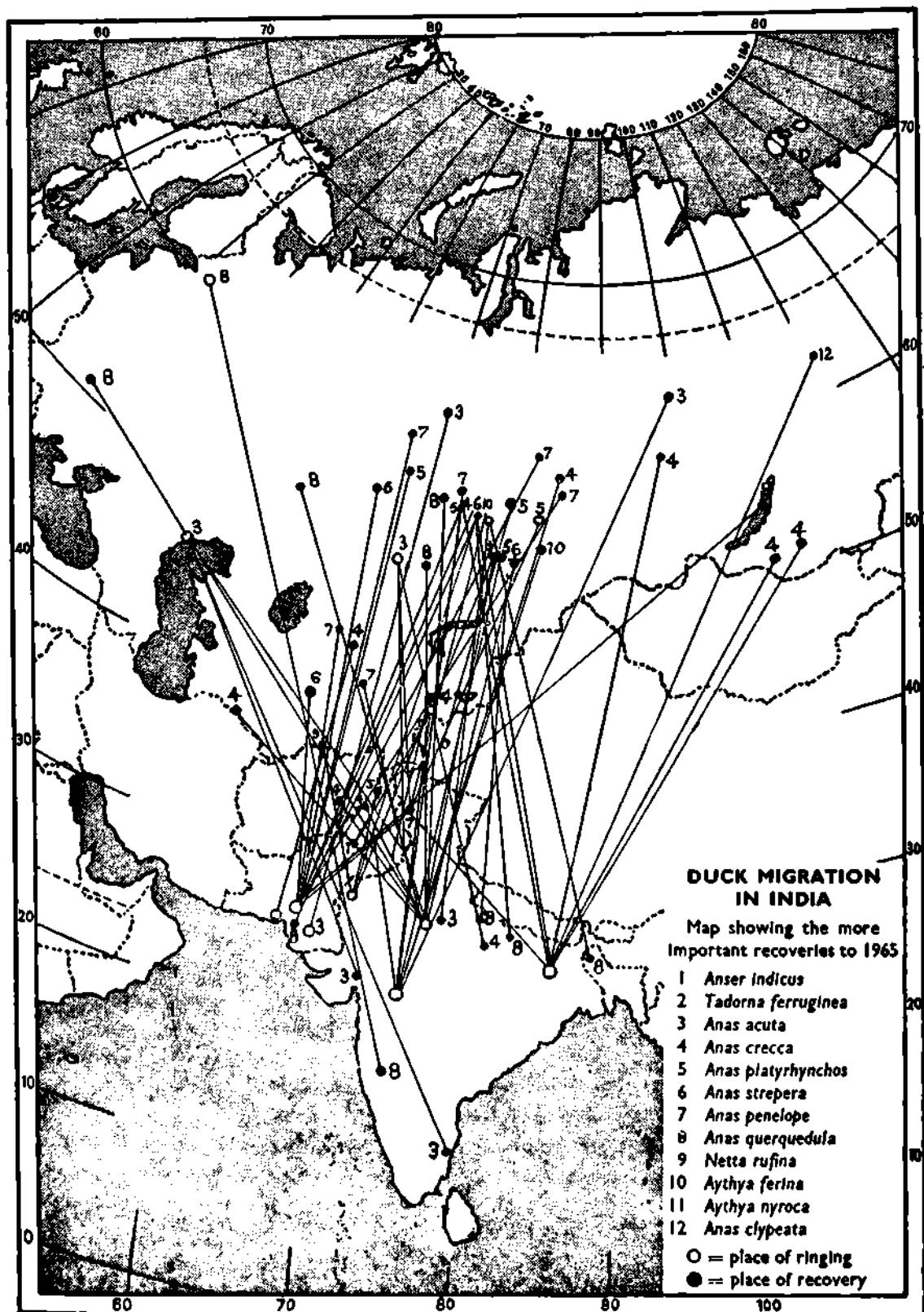
In so far as Ceylon is concerned there is some evidence for the presumption that not only do both the western and eastern arms of the palaeartic migration into the Indian peninsula cross over into the island, but also of a third route that brings NE. Asiatic migrants through Indochina and Thailand via the Andamans. So far, however, no direct proof of this has been provided by ring recoveries (Phillips 1956).

Our knowledge of Indian bird migration has so far consisted largely of fragmentary records, often of a subjective and conjectural nature.

The first attempt to rectify this deficiency was a modest scheme of bird-ringing initiated in 1926 by the Bombay Natural History Society with the active cooperation of the then Maharaja of Dhar (Sir Udajirao Puar) and the rulers of a few other Indian States, as well as some of the larger zamindars of Sind. Considering the meagreness and haphazard nature of that experiment, which virtually petered out by 1934 through lack of funds, the results proved unexpectedly gratifying. Those early ring recoveries constituted our first positive confirmation that most of our migratory ducks are in fact derived from Siberia and from central and northeastern Asia, often over distances of 3000 to 5000 km. and more. In addition to Indian-ringed birds recovered in the U.S.S.R., some highly significant recoveries of European-ringed birds in India were also obtained during the same period: a Green Sandpiper (*Tringa ochropus*) ringed near Moscow, in Kerala; a White Stork (*Ciconia ciconia*) ringed in western Germany, in Rajasthan; and a Rosy Pastor (*Sturnus roseus*) ringed in Hungary, in the Punjab.

It was not till the year 1960 that a more comprehensive project for bird-ringing in India became possible through the cooperation of various scientific organizations interested in the problem of possible dissemination of arthropod-borne viruses by migrating birds. During the seven years of operation of this scheme nearly a hundred thousand migratory birds have been ringed, chiefly wagtails (Motacillidae) and of several other passerine families, in addition to ducks (Anatidae) and waders (Charadriidae). So far all the work has been done departmentally by the Bombay Natural History Society in a few selected localities, but it is proposed to expand the programme with the cooperation of individual ornithologists and naturalists' associations into a coordinated network of ringing field stations giving the widest possible coverage over the subcontinent. The intensive ringing of migratory birds, combined with visual records and other data regularly maintained by competent observers and over prolonged periods of time, and supplemented by modern migration study techniques and mechanical devices such as radar, can alone provide an unequivocal picture of the situation in our area. Of all these, perhaps large-scale bird-ringing is the most immediately important.

The aluminium rings used by the Society are of several appropriate sizes. They bear the inscription INFORM BOMBAY NAT. HIST. SOCIETY together with a serial number prefixed by a letter of the alphabet denoting size. In order to coordinate all ringing activities in the subcontinent and minimize dissipation of effort and data, it is desirable that only the Bombay Natural History Society's rings should be used, as is being done in Ceylon. All recoveries, whether of these rings or foreign ones in India, should be reported (preferably accompanied by the actual ring) to the Society as the central organization



in this part of the world for ringing and maintaining records and furnishing up-to-date information.

Very little has been published on Indian bird migration, and that largely as haphazard parochial arrival and departure dates of random species in random parts of the country. Most of these records are scanty and irregular. They are, moreover, buried away among regional bird papers published from time to time chiefly in the *Journal of the Bombay Natural History Society* or *The Ibis*, and difficult to unearth and collate.

The map indicates the pattern of Anatid migration as revealed by the recoveries of ringed ducks in and from the subcontinent to date. This, in general, is the pattern gradually developing in the case of other palaeartic migrants as well, but it may be a long time before we have sufficient authentic data to deduce satisfactory specific conclusions. Details of a few significant recoveries will be found under the species concerned.

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ZOOGEOGRAPHY OF THE INDIAN SUBREGION

THE 'Oriental Region' (or Indian Region as he called it) was first proposed as one of the six zoogeographic regions of the world by Philip Lutley Sclater in 1858. His subdivisions were based on the study of birds for he was an ornithologist. In spite of the century of discussion and research that has ensued, his arrangement is still followed today. A more specific discussion of the zoogeography of India followed in the paper of Blanford (1901).

Broadly speaking the Oriental Region encompasses most of what is today known politically as India, excluding the higher reaches of the Himalayan mountains although the Oriental fauna and flora extend up to 11,000 feet in some cases (Ripley, 1961). Nepal, Ceylon and adjacent islands, East Pakistan, and large areas of southeast Asia are included in the Oriental Region.¹ West Pakistan is a much drier area and belongs to a transition zone of southern Eurasia, partly the Palaearctic Region so-called, with drier, more temperate climate, partly trending towards the hot dry Somali arid zone of Chapin (1932), as described for Arabia (Ripley, 1954).

In his excellent general book on zoogeography, Darlington (1957) has pointed out that the interpretation and study of the patterns of distribution of animals which makes the subject of zoogeography consists of a number of subpatterns. The first and broadest of these is *limitation*, the final limits of a species or a larger grouping—a genus or family or class of animal. Within geographical limits certain classes of animals exhibit roughly parallel distributions. The assembling and considering of the *limits* then to which cold-adapted or warm-adapted animals proceed, tends to bring into rough focus the concept of zoogeographical regions of the world. Thus the Oriental Region besides being a geographic part of the land and fresh waters of the world, has a certain limit imposed on it by climate and temperature within which groupings of animals find their preferred home.

A second subpattern is *zonation*, implying climate, and it is fundamental to the land divisions of the Oriental Region that it falls primarily within the tropical zone with fingers extending up into the mountains. Mountains of course in tropical latitudes serve as islands. By proceeding upwards and gaining altitude the tropical zone is lost gradually and at a steady rate. Gradually the subtropical, then the temperate zones are encountered, and finally at the greatest heights, the alpine zone may be reproduced as it were, duplicating conditions found in the tundras of the far north or the subantarctic.

¹ For a fuller account see Sélim Ali 1964, Article 'Oriental Region' in Thomson, A. L. (ed.), *New Diet. Birds* (London & New York).

A third pattern is that of *geographical radiation*, of spreading outwards of a particular group of animals from some geographic centre. A powerful world centre for animal evolution has apparently been the old-world tropics so-called, the heartland of which is the Oriental Region. Thus in the case of birds, the dominant families of birds in India belong to what is sometimes called the 'Indochinese' fauna, the birds adapted to life in warm, moist tropical southeast Asia, birds primarily of jungle or heavy forest. The geographical ramifications of southeast Asia, the tangled patterns of mountain chains, river drainage systems and a long period of stable climate seem to have been ideal for the evolution of a wide array of species of birds.

A fourth subpattern is that of *differentiation of faunas*. Here in the tropics of the Oriental Region this is well illustrated in birds where there is great diversity. Over sixty per cent of all the endemic species of Indian birds (endemic meaning restricted to a particular place) are of the 'Indochinese' subregion so-called, confined to the Oriental Region.

Darlington's fifth subpattern is that of *concentration in the largest, most favourable areas*. Here again this phenomenon is well-illustrated in the response of the bird fauna of India which, being predominantly tropical, occurs in greatest concentration in the largest areas of rainfall in eastern India, East Pakistan, along the mountain chains wherever the monsoon shadow occurs, especially in southwest India, in parts of Ceylon and in the Andaman and Nicobar Islands.

Of all the zoogeographical regions of the world, perhaps the Oriental is the least limited by barriers, but at the same time it is one of the principal if not the principal one from the point of view of evolution and of having acted as a centre of dispersal. Only northern South America has a richer fauna, only tropical America, and some of the most isolated areas like New Zealand, have a higher rate in proportion of species formation and evolutionary response.

A brief review of geological origins may be appropriate here. In Permian times, more than two hundred million years ago, the peninsula of India and an inter-connected Ceylon, all the area south of the Ganges river basin, was part of a continental region. This massif is composed of ancient rocks which to the geologist are representative of a continent. These rocks are known as the Gondwana formation and the outlines of this ancient continent can be traced up to northwestern India on the west, towards Calcutta on the east, with the edges of marine sediments marking old coastlines, and old river beds emptying into areas of former seas. The special fossil shells of this rock show that the continent was rimmed by far cooler seas than today. What the continent of Gondwanaland consisted of may never be known, but there are clues from the presence of similar rock formations. It may have spread south as far as the Seychelles Islands to Madagascar, east to western Australia, and perhaps even farther south and west. Whatever

the connexions of this ancient past, we do know that the continents were presumably closer together many aeons ago. Recent studies of oceanographers and geophysicists show systems of ridges deep in the oceans which parallel the continental masses and may well indicate a gradual expansion of the earth's exterior surface by the process of internal connexion or the transfer of rock materials under great heat and pressure. The continents thus may be drifting apart under the slow convection of the earth's interior at a rate of perhaps one centimetre a year. But from the point of view of the distribution of warm-blooded vertebrates these ancient connexions have little if any influence.

Between Palaeozoic times (including the Permian) and Recent time comes the vast stretch of the Mesozoic or Age of Reptiles, occupying more than one hundred thirty million years. Birds probably had their origin during the middle of this Era but it is the Cenozoic or Recent Era of the last seventy million years which has seen the evolution of birds as we know them today, warm-blooded, with feathers, untoothed bills and the other physical features of their class.

Large parts of the northern Oriental Region were under water until well on in the Recent, the Cenozoic Era. The northern fringes of the Himalayas were under the water of the great central Eurasian sea, the Sea of Tethys which continued into Pliocene times, less than twenty million years ago, gradually drying and retreating to leave behind the Mediterranean, the Black, Caspian and Aral seas. The former boundaries of the Tethys Sea extend south to West Pakistan and central India and included the drainage basin lowlands of the Indus and Ganges river systems. As the seas gradually disappeared and land rose, violent stresses in the outer layers of the earth produced foldings of the mantle to raise up mountain chains from the Alps east to the Pamirs and the Himalayas and the north-south systems of ridges of eastern Assam, Burma and southwest China.

The most recent geological period has been the Pleistocene or Ice Age, marked by four successive cold periods with cycles of glaciation, lowered climate and increased rainfall alternating with milder, drier intervening times. During these alternations, the locking up of water in the form of ice lowered the sea surface to connect many continental shelf islands such as Ceylon with the mainland. Our present climate of relative warmth and unlocking of ice with rising seas has persisted for approximately ten thousand years.

In terms of climatic history, India and the related components of the Oriental Region have been stable for a very long time. The recent ice ages of the Pleistocene may well have coincided with increased rainfall or pluvial periods in the tropics. Greater humidity and accompanying cloud cover help to create cooler average temperatures. All these conditions would suffice to lower temperatures sufficiently on mountain ranges or highlands so that temporary avenues or highways

for mountain stepping-stone-hopping can be provided for species of animals and plants adapted to cooler climates. Much of the spread then of mountain-adapted or cool climate-adapted species into the highlands of the tropical zones and their later isolation and evolution in time into a radiating network of related species can be postulated as a result of one's knowledge of the changes in the climate cycles in the Pleistocene. Thus geographical isolation could combine with small climate changes to promote adaptive changes in species. Subsequent climatic events bringing together former isolated populations a second or third time would serve as the testing ground to determine if genetic isolation had been achieved. If so, new species had been born in the process.

One of the most noted current zoogeographers of India was the late Dr Sunder Lal Hora of the Zoological Survey who developed an important thesis of the distribution of torrential river fish. His Satpura Hypothesis (1950) postulates that by middle Eocene times at the beginning of the Recent or Cenozoic Era, the Himalayan mountains began to erupt, rising up and starting the cutting off of the Tethys Sea. This rising has been slow and continuous down through the Pleistocene. South of the Himalayas in the northern Indian Peninsula volcanic action occurred in late Cretaceous and early Eocene times covering some 20,000 square miles of land with a thick series of volcanic layers known as the Deccan traps. The result was that formerly continuously distributed tropical climate species of plants, insects and vertebrates became isolated in south India and Ceylon, separated from related populations in eastern India and east to China. These upheavals, traced by geologists, affected the drainage of rivers and the distribution of related fish. Originally, peninsular Indian streams up to the Miocene Epoch had drained north into the Sea of Tethys or its related river systems. The Deccan explosives and the Himalayan rise turned peninsular Indian drainage systems to the east. Contemporary rivers of southern China and southeast Asia changed their courses from east to south and west enabling their fish species to reach Burma. Dr Hora believed that these fish from southern China eventually populated the Himalayas from the east, spreading very gradually westwards. Fossils of the Pliocene Epoch just before the Pleistocene show that fish species were becoming distributed west along the feeders of the great river called by geologists the Indobrahm, which drained the enormous marshes left by the disappearance of the Sea of Tethys.

South of the Indobrahm at the edge of the Deccan traps arose an elevated series of hills running from east to west from the southern edge of the Himalayas in Bengal and Bihar nearly to the sea at Bombay. Hora explained the distribution of the hill-stream fish along these Satpura Hills from the eastern Himalayas to western peninsular India and eventually gradually south to Kerala, and, in a few cases of related

forms of higher vertebrates and plants, aided by the climate cycles, south into Ceylon.

By Pliocene times the Ganges system of today began to form, draining the Himalayas and flowing south and east instead of west as had the Indobrahm. A recent feature of this system has been the capture of the Tsangpo, the eastward-flowing river of Tibet, through the penetration by climatic erosion of the upper Assam gorges by the Brahmaputra, a tributary of the Ganges system. Presumably the Brahmaputra did not manage to erode its way north into the Tibetan gorges to capture the Tsangpo, turning it away from the Yellow River and Yangtse systems very recently. But in a relative sense it must have been rather recently in the Pleistocene Epoch.

Even though much of this history is old, as far back as Pleistocene or late Miocene times, the resulting evolution, the resulting patterns of distribution of the avifauna of India as it is understood today, show distinct traces of these events. Sálim Ali (1949) has pointed out the importance of the Satpura Hills as an ornithogeographical highway, as has Ripley (1949).

In regard to the great marshes of late Pliocene time, aftermath of the Sea of Tethys, it would appear that several bird species in their peculiar evolution and adaptation mark the long persistence of this phenomenon. They can be thought of as living relics of a past epoch. The preference of these species is for marshes of large extent along the remains of the system, the 'Indobrahm system'. That they remain today means only that the resulting river and marsh habitats have not been too unsuitable, although one of the species has unfortunately very likely become extinct in the last thirty years. This is the Pink-headed Duck, *Rhodonessa caryophyllacea*, a relict species of the present Ganges river drainage area (Ripley, 1953).

Two other species of local distribution in marshy areas in the central and northwestern parts of the subcontinent are: 1) the Bristled Grass Warbler, *Chaetornis striatus*, and 2) the Sind Jungle Sparrow, *Passer pyrrhonotus*, the latter found as far west as eastern Iran.

Indian zoogeography shows evidence for two of the well-known zoogeographic theories. The first of these is Gloger's theory, which states that in areas of increased humidity warm-blooded animals tend to have darker surfaces than their immediate relatives living in drier areas. Many species of birds and mammals which live in the forests along the foot of the Himalayas, in the Western Ghats, or in Ceylon tend to substantiate Gloger's theory. Such small forest birds as partridges, babblers, flycatchers, warblers and sunbirds have paler populations—geographical subspecies so-called—living to the west in areas of decreased rainfall. Along the sweep of the Himalayas where the monsoon rains fall more heavily in the east, east of eastern Nepal, this phenomenon shows as a break, a discontinuity in the continuous gradual progression

of colour tones of the bird populations. West of this break in the climate, bird populations tend to be paler, to the east darker.

Another theory is that of Bergmann. Bergmann's hypothesis states that warm-blooded animals tend to become larger than their nearest relatives, in areas of increased cold climate. This genetic selection is in response to the physical fact that a larger animal has a diminished exposure of surface in relation to its internal volume than a smaller animal. Thus a mouse, for example, has a greatly increased surface area compared to its internal volume than has a larger rat. The theory implies, however, that only closely related geographical subspecies of the same species be compared. Certain bird species in the Himalayas appear to respond to this hypothesis as their high-altitude populations are larger than their plains relatives. Some warblers, magpies, bush chats, robins, mynas and a nuthatch seem to show size differences. Again throughout the Indian plains there seems to be a similar correlation with degrees of latitude. Many species of birds living year-round in the plains south of 20–22° N. latitude tend to average smaller in overall proportions than the populations of the same species living farther north. Examples of this may be found in the pigeons, parakeets, trogons, drongos, mynas and bulbuls among others.

Zoogeography is certainly not a static study, for one of its major principles is that no climatic zone, no set of physical circumstances connected with a geographic area, none of these, are ever stable or immutable. The dry zone areas from Egypt and the Red Sea countries north to the mountains of northern Iraq and Iran and east into West Pakistan have had much the same climate for the last eight thousand years, but overall desiccation has been progressive during this period, greatly speeded up perhaps in the last fifteen hundred years, and galloping indeed in the last three hundred years. This area has become the arena in which sheep and goats are triumphant. The pastoral flocks and herds have prevented the acacia and thorn scrub which once covered the land from perpetuating itself. With the scrub has gone the grass, and eventually the decline of streams, resulting in all the forced counter-measures at enormous expense and effort which from time to time have been invented to stop the relentless march of desert created by man's domestic helpmates.

Records of the seventeenth century in India tell of the Mughal court and the hunting exploits of emperors like Jehangir who personally killed 3203 large mammals between the age of twelve and forty-eight.¹ These records show a strikingly different environmental pattern from our own. Rhinoceros, found today in India in two limited areas in the northeast, in West Bengal and Assam, and in the central Nepal terai, then occurred north to Peshawar on the northwest frontier of West Pakistan. Northwestern India and much of West Pakistan are semi-deserts

¹ Salim Ali 1927: 841.

today. Heavy swampy undergrowth and savannah forest suitable for rhino must have been continuous in extent in the seventeenth century at least eight hundred miles to the northwest of where it occurs at present. And here climate itself has not been a factor. It is worth remembering in the context of zoogeography that human beings can affect the habitat rapidly and irreversibly through overgrazing and fires, and eventually animal distribution itself. The discipline of zoogeography thus has much to teach conservationists. Certain species of animals which are on the lists of threatened species made up by various international organizations today are in this perilous state directly as a result of long-range changes in the environment brought on by overgrazing or over-cultivation or similar land-use habits which have become an almost immemorial pattern in many cases.

In this context it is vital to recall that birds, just as other animals, are pinned to that environment for which genetic selection and adaptation have suited them just as surely as other animals. Though mobile and air-borne, birds select the habitat whether on migration or through cycles of wandering in search of food, or through protracted residence, which most nearly suit their special, their own adaptations for food-gathering, roosting and nesting, for protection from predators or for adaptations to climate. It is worth considering some of the fifteen or so forest types found in India and pointing out how closely birds are related to these environmental conditions. These types have been delineated by Champion (1936) and are described and illustrated in *Synopsis* (1961), pp. ix-xvi. Here certain species of birds may be seen, and only here.

A) Tidal Forest can be described as an evergreen forest of species of mangrove trees reaching c. 30 m. in height, found usually on soil covered at high tide, with an undergrowth of *Pandanus*, canes, some grasses, and many low-height mangrove species, especially nearer the sea. The mean annual temperature is 27° C. with an annual rainfall of about 270 cm. The soil is entirely river-borne silt, often with a coating of overlying sand. This type of forest is found along creeks on the west coast of India and West Pakistan (near the mouths of the Indus), and on the east coast at the mouths of the Mahanadi, Krishna and Godavari rivers, in the Sunderbans of India and East Pakistan, along brackish creeks in Ceylon, and in the offshore islands, particularly the Andamans and Nicobars.

Certain species of birds are primarily only to be found in this habitat:

- 1) Brownwinged Kingfisher, *Pelargopsis amauroptera* (No. 729 of *Synopsis*). East Pakistan and southeastern West Bengal.
- 2) Blackcapped Kingfisher, *Halcyon pileata* (739), more likely to occur in tidal forest than anywhere else, although wanders inland in the cold weather.
- 3) Whitecollared Kingfisher, *Halcyon chloris* subspecies (740-743), southern Maharashtra, Sunderbans, and offshore islands.

4) Bluewinged Pitta, *Pitta moluccensis megarhyncha* (868), tidal forest and adjacent semi-evergreen forest in the Sunderbans of East Pakistan.

5) Grey Thickhead or Mangrove Whistler, *Pachycephala cinerea* (1470), Calcutta east through the Sunderbans, mostly in tidal forest, but also inland in semi-evergreen forest; Andaman Islands.

6) Orangebellied Flowerpecker, *Dicaeum trigonostigma* (1898), tidal forest in Sunderbans and adjacent semi-evergreen and moist deciduous forest.

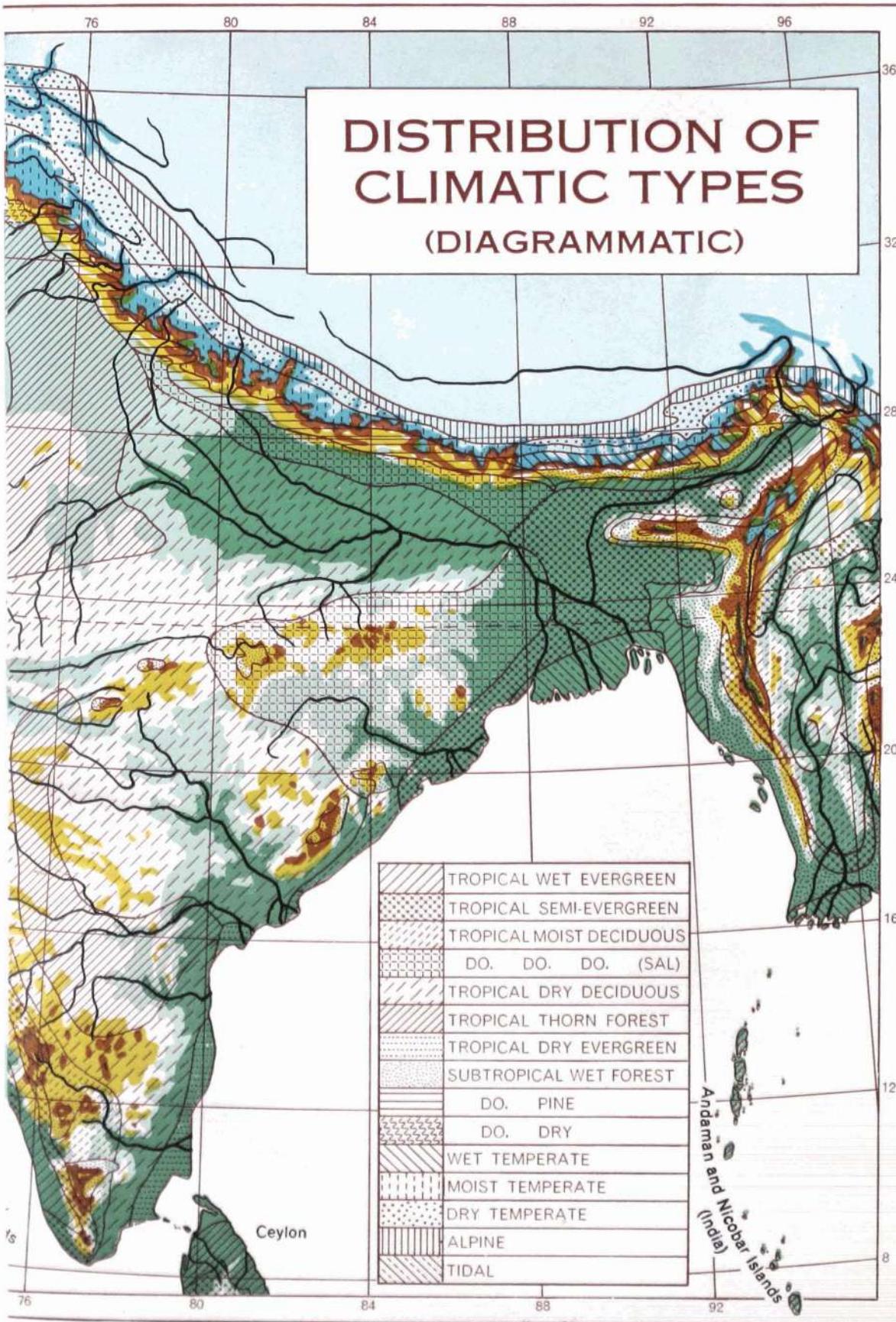
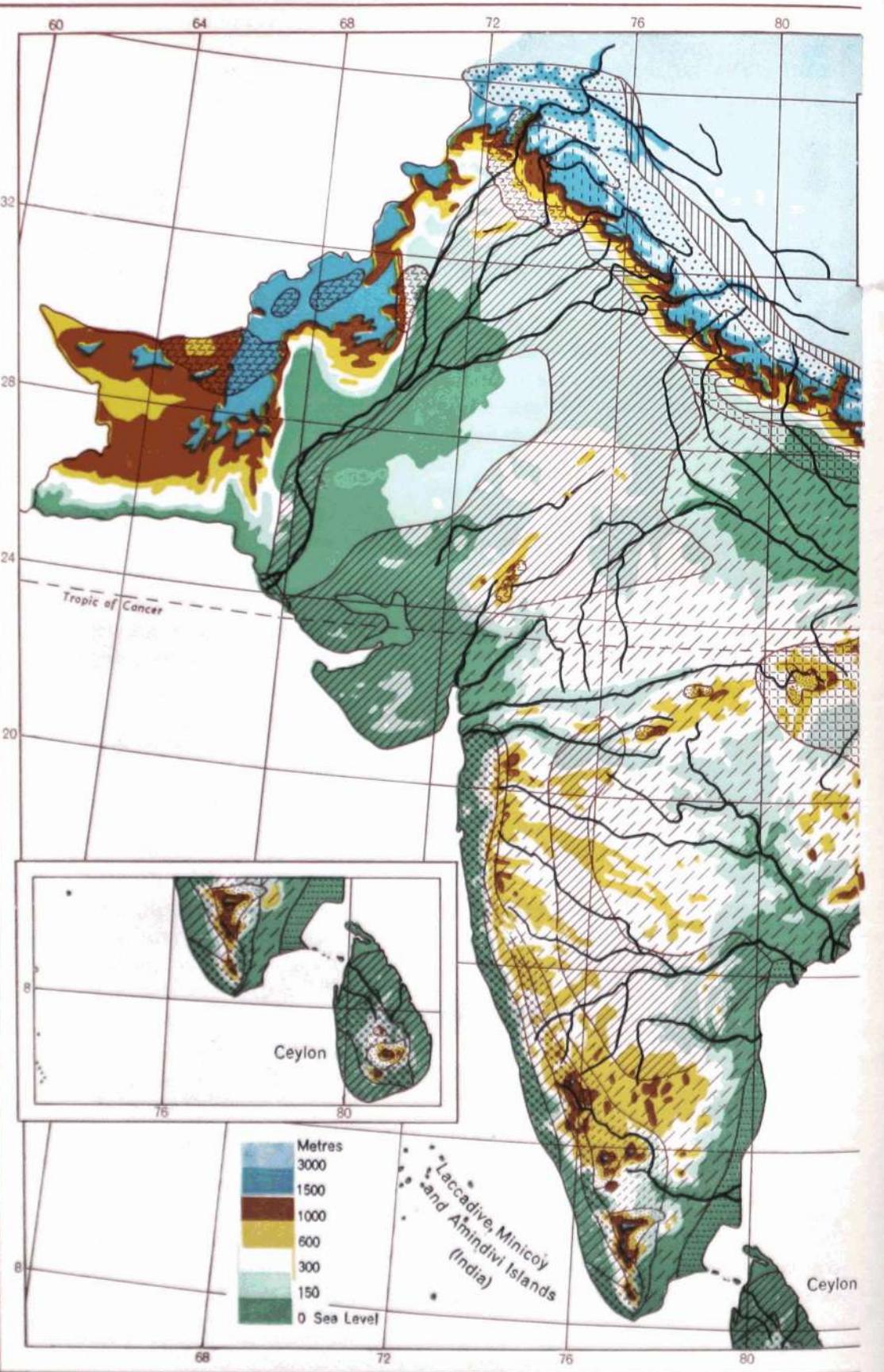
In addition certain hawks, eagles or rails may be found in tidal forest but these species have a wider tolerance for a variety of conditions.

Related to the tidal forest in space and in food supply are the sea beaches themselves, where characteristic migrant shore birds, gulls and terns can be found. Some of these species prefer the open pure salt water and adjacent beach, others the tidal mudflats and brackish reaches of water, and many of these forms, particularly the terns, nest in the mangroves. The Reef Herons, *Egretta gularis schistacea* and *Egretta sacra* (50, 51), are found only on brackish or salt water, along tidal mudflats or reefs, the Crab and Great Stone Plovers, *Dromas ardeola* and *Esacus magnirostris* (434, 437, 438) are found only on sea beaches, though the latter may occur on sandy river beds of the largest rivers, an *ersatz* or substitute biotope as it were.

In contrast to the tidal forest zone, the birds of which show affinities with species of Indonesia and the China coast — the Indochinese sub-region as it has been termed by zoogeographers — consider for a moment another zone which recalls the Somali arid zone of east Africa. This is

B) Tropical Thorn Forest. This is a low open forest, characterized by *Acacia* species, reaching 6–9 m. in height, desert-like under-growth with sparse grass, thick, woody weeds, succulents, a so-called xerophytic type of vegetation, mean temperature annually 25° C., reaching a maximum of c. 40° C., and a minimum of c. 4° C. The annual rainfall varies from 48 to 76 cm. and is sometimes as low as c. 25 cm. The soil is shallow, often alkaline. This zone occurs from sea level to c. 600 m. altitude. Thorn forest occurs in non-desert parts of West Pakistan, south of the frost line, large parts of western India, in East Punjab, Rajasthan, Kutch and Saurashtra and southwest Madhya Pradesh running south in Maharashtra to East Khandesh, Aurangabad, south to northern Mysore and east in Andhra to Guntur district; also in the Jaffna area and other parts of northern Ceylon, Rameswaram Island and the adjacent southeast Indian coast. In central peninsular India the heart of this zone occurs in the Deccan plateau, site of much of the Deccan trap rock-formations mentioned earlier.

The birds of this zone show distinct affinities with those of eastern Africa as pointed out by Meinertzhagen (1951), and emphasize that



Africa itself has been a centre of dispersal as shown by Moreau (1952) and noted in one case by Husain (1958). Typical of these are:

- 1) Grey Partridge, *Francolinus pondicerianus* (244-246), West Pakistan and India.
- 2) Likh or Lesser Florican, *Sypheotides indica* (357), tropical thorn, scrub, grassland, and cultivation in southern West Pakistan and western and central India.
- 3) Jerdon's Courser, *Cursorius bitorquatus* (441), perhaps extinct, Deccan tropical thorn forest.
- 4) The Bee-eaters have two species which suggest strongly a preference for this zone, though their more wandering habits and wider distribution make them less good examples. These are the Bluecheeked, *Merops superciliosus* (747) which breeds in West Pakistan and India and winters in Africa, and the Green, *Merops orientalis* (749-752), which occurs in tropical thorn forest from Iran to Ceylon, although one population of the species reaches Assam and Burma.
- 5) Two Finch-larks of the genus *Eremopterix*, namely *grisea* and *nigriceps*, the Ashcrowned and the Blackcrowned (878, 879), are Ethiopian in their affinities and live in thorn scrub and the edges of desert in tropical thorn areas.
- 6) Sykes's Crested Lark, *Galerida deva* (902), is found in parts of northern India and the Deccan on rather dark soils.
- 7) Yellowthroated Bulbul, *Pycnonotus xantholaemus* (1135), peninsular India, perhaps ranging too high in altitude to be completely in this zone.
- 8) Common Babbler, *Turdoides caudatus* and its relatives, Large Grey Babbler, *T. malcolmi*, and Whiteheaded Babbler, *T. affinis* (1253, 1254, 1258, 1267, 1268), West Pakistan, peninsular and northern India and Ceylon.
- 9) Rufousfronted Longtail Warbler, *Prinia buchanani* (1506), West Pakistan and northern and central India to the Deccan.
- 10) Three of the Whitethroats, the Lesser, *Sylvia curruca*, the Small, *S. minula*, and Hume's Lesser, *S. althaea* (1567, 1569, 1570), breed or winter in tropical thorn forest in West Pakistan and India.
- 11) Two of the Leaf Warblers, the Brown or Chiffchaff in its Indian subspecies, and the Plain, *Phylloscopus collybita sindianus* and *P. neglectus* (1576, 1577), occupy this habitat in West Pakistan and northern India.
- 12) Brown Rock Chat, *Cercomela fusca* (1692), West Pakistan and northern India.
- 13) Whitewinged Black Tit, *Parus nuchalis* (1798), India.
- 14) The Spanish Sparrow, *Passer hispaniolensis* (1940), winters in tropical thorn forest. Some other sparrows have ranges suggestive of a preference for the tropical thorn biotope, but have spread out into cultivation or into reed-beds and tamarisk groves.

With the exception of the warblers, virtually all of these species are related most closely to Ethiopian (= African in the zoogeographical sense) species, suggesting an origin from a former continuously distributed population or a common ancestor in some form.

As was pointed out in more detail in the *Synopsis*, there are certainly 176 endemic (local) species of Indian birds (confined to the zoogeographic subregion of the Indian Peninsula and its environs) and of these the following affinities appear:

| | | |
|---------|--|------------------------|
| (1) (a) | related to Palaearctic species (i.e. Europe and Asia) | |
| | number 30 | Percentage of total 17 |
| (b) | questionable, perhaps Palaearctic | |
| | 2 | 1 |
| (2) | related to Indochinese (i.e. SE. Asian species) | |
| | 109 | 62 |
| (3) (a) | related to Ethiopian species | |
| | 30 | 17 |
| (b) | questionable, perhaps Ethiopian | |
| | 1 | 1 |
| (4) | relict species, discussed earlier (Pinkheaded Duck etc.) | |
| | 4 | 2 |

Thus the overwhelming proportion of Indian bird species are related to species of the eastern, tropical Orient, with almost an equal minor share being related proportionally either to African or to European-northern Asian (Palaearctic) species. This is important as a principle of Indian ornithobiography. The Himalayas have served as a barrier, encouraging the spread of tropical, Indochinese-related bird species into the Indian habitat, preventing the invasion of Eurasian-related species as much more than winter migrants. The entomological and botanical evidence, such as it is, suggests that in spite of glaciation in the Himalayas during the Pleistocene, climatically conditions were not too severe and that indeed the southern flanks of the mountains served as a refugium for relict species related to cold-climate adapted northern species, rather than serving as a continuous chain of contact along which dominant northern species could infiltrate. The habitats to the south of the Himalayas thus being continuously occupied, very few invaders could wage successful competition or find empty niches and room to spread out.

India's avifauna is one of the most interesting in the world and provides ample opportunity for further significant research in zoogeography and its related aspects of ecology.

SYSTEMATICS OF BIRDS OF THE INDIAN SUBREGION

BIRDS from the 'Indies', the areas now encompassed by Pakistan, India, Ceylon and east to Java, have been known to zoologists for as long as there has been an organized science of zoology. Travellers and explorers of both the eastern and the western worlds have collected colourful birds from the countries which they visited since the chronicles of these travels have existed. These creatures, brought back to the courts of emperors and kings, inspired wonderment as well as scientific curiosity. Attempts to list the products of nature are apparently a natural phenomenon of man's orderly and tidy mind. Man is instinctively an arranger. Subjectively man strives to create a rational order out of what otherwise he assumes to be chaos. Religion demands it. Science requires it.

The literature of these attempts at organization is classical, extending back to the philosophers, Hippocrates, Aristotle and Plato, at least to the fifth century B.C. Systematics, or taxonomy as it is often interchangeably called, is the science of classification of animals. It is built up out of the basic study of the anatomy or morphology of an animal, as well as its physiology, or the living interactions of the organ systems and structure of the animal. Modern taxonomy also includes a compilation of evidence obtained from genetics, the study of the breeding of animals including the cellular phenomena associated with the union of components from egg and sperm. An additional requirement is a knowledge of the environment and its effect upon animals, or ecology, as that study is called, as well as environmental and animal history derived from the study of geology. Thus a modern taxonomist becomes perforce an evolutionist, and an evolutionist should properly be one of the most widely trained of all zoologists, proficient in genetics, morphology, zoogeography, systematics, embryology, physiology, ecology and palaeontology.

Present-day systematics developed in the eighteenth century with the attempts to create 'systems' of nature. A number of authors such as John Ray (1627-1705) pioneered attempts to characterize the genus, or *genos*, and species, or *eidos*, of Aristotle, but it is the Swedish naturalist, Carolus Linnaeus (1707-78), who laid the foundation of systematic zoology. The tenth edition of his *Systema Naturae* (1758) is considered the fundamental work and the date, the foundation date for species names. Each animal then known to the scientific world could be given, under the Linnaean concept, a binomial name: Genus, a name including all forms considered to be related to one another, and Species, the distinctive or specific name which in a sense separated that animal from all others. All ducks belonged to the genus *Anas* for

I SYSTEMATICS OF BIRDS OF INDIAN SUBREGION

example, and the different ducks had different specific names, *acuta* for the pintail, *crecca* for the common teal, *penelope* for the wigeon, *ferina* for the common pochard or diving duck. Above these categories was the Order, and above this of course the Class, which in the case of birds, involved all birds in one animal class, AVES. The great merit of the Linnaean volume is that the class and the orders and genera are characterized by keys, groups of characters which give them uniqueness and distinction one from the other.

This arrangement then, this attempt at the creation of order from chaos, immediately won general recognition and has persisted down to the present. Subsequent modifications of the system have derived more from man's understanding of the evolutionary process and the resultant interpretation of what is meant, than from any tampering with the mechanics. In essence the philosophy of arrangement has changed with the influence on scientific thought of the Darwinian school of evolutionists. In Linnaeus's concept, each species was a distinct act of Creation, immutable and set apart. The Lord had created the world and all that lay within it in six days and on the seventh he rested. Darwin and related scientists of the mid-nineteenth century were able to show that species were not immutable, that changes occurred dating back through the panorama of geologic time and continuing on into the present and future. Species could arise out of other species, by a process involving physical isolation and the gradual accretion of small differences.

Over the years the acceptance of a dynamic rather than a static concept for species formation broadened and modified systematics. As knowledge of a wide spectrum of variations in populations of biological species increased, new terms came to be used for these differences. Linnaeus himself used the word 'variety' to describe a specimen that appeared to be atypical. Later nineteenth-century authors like Kleinschmidt began to use the word 'race'. Gradually the concept began to be refined as it became generally understood that what scientists were trying to characterize were not individuals, aberrations that is to say, individual variants, but rather groups or populations all members of which, in interaction with each other, were expressing an evolutionary trend. Thus the concept of subspecies was evolved. The definition of this category was not really refined until the twentieth century when a number of authors particularly in ornithology, such as Rensch and Mayr, reached a consensus. Two great principles are involved here. The names typifying these evolutionary categories are applied to a type specimen certainly, but they refer to an interbreeding population of common genetic inheritance. In addition a subspecies must have some geographic locus and some complex of external mechanisms which allow it to maintain genetic isolation. A subspecies must also have some essentially morphological characters

in order to allow it to be recognizable. Morphological rather than physiological or behavioural characters are still more acceptable to taxonomists than any others as they are more feasibly preserved in specimens.

All of this history of description and characterization of species has resulted in an elaborate series of rules of nomenclature over which systematic biologists have laboured for many years. The rules, after meetings and international congresses, eventually become codified into a Code for Zoological or Botanical Nomenclature. The latest official International Code of Zoological Nomenclature was published in 1961, reissued with some amendments and corrections in 1964 and will undoubtedly be reissued again and yet again. For it has become apparent over the past fifty years that man approaches his own attempts at systematizing the affairs of nature in an essentially subjective manner. Science has not yet afforded us visions of illimitable truth. Many of the essential facts of nature still elude us, and so even man's rules for order and precedence are finite. At least in the meantime we reach towards stability as we attempt to order nature.

The first bird from India to reside in the stable nomenclature of Linnaeus in 1758 was the Brown Shrike, *Lanius cristatus*, which appears on page 93 of *Systema Naturae*, the 10th edition, and is described thus: having a 'wedge-shaped tail', a 'crested head', a 'reddish body' etc. and, as with all proper names a type locality must be supplied, in this case 'Benghala' or Bengal. There is a citation to an illustration, plate 54, in George Edwards's volumes, published 1743-51, *A Natural History of Birds*. And so the type was established, a specimen figured in a published book and with a locality. The second species from 'Benghala', named by Linnaeus on page 95, is *Lanius caerulescens*, which is also illustrated in Edwards and which is now understood to be the Whitebellied Drongo, *Dicrurus caerulescens*, belonging to a different family. Linnaeus's name as author is suffixed to both *Lanius cristatus* and *Lanius caerulescens* when these names are used formally in citations in ornithological literature. But for the second bird it is placed in parentheses, as *Dicrurus caerulescens* (Linnaeus), to express the fact that the genus name has been changed or shifted subsequent to Linnaeus's original description of the species.

The third mention of Bengal in Linnaeus is *Psittacus alexandri*, whose habitat was said to be 'China, Benghala, Aethiopia', named after Alexander the Great, through whose expeditions the Redbreasted Parakeet had come to the notice of Pliny. The type of the species has subsequently been restricted to Java. Subsequently a larger subspecies has been recognized as occurring on the Asian mainland. A name for this was available, *fasciatus* of P. L. S. Müller, 1776. Consequently when subspecies are arranged in linear form, the parakeet of

India becomes *Psittacula alexandri fasciata* (P. L. S. Müller)¹, and *Psittacula alexandri alexandri* (Linnaeus) is found in parts of Indonesia, the type locality being Java. And so zoology proceeded apace. Thomas Pennant's *Indian Zoology* 1791 (1790), incorporating the work of J. R. Forster and Loten's notes on new birds of south India and Ceylon, was succeeded by the really masterful work of T. C. Jerdon, whose *Birds of India*, 1862-4 in two volumes, was the first thorough work on the subcontinent.

Allan O. Hume added greatly to Jerdon's work by expanding the areas covered, particularly in the east in Assam and East Pakistan and describing many new birds for science. He also prepared the first checklist, in 1879, taken from Volume VIII of the random journal *Stray Feathers*, which he had organized and published himself. Hume's list included Pakistan, India, Ceylon and Burma east to northern Malaya, and comprised over 1700 species. He attempted to codify the rules of nomenclature as involving birds of the area by using the rules for nomenclature adopted at a meeting of the British Association in 1842. Wisdom was not infinite even then.

Hume says (p. 7): 'I say "based on the Code" because it must be clearly understood that I am not prepared to re-argue points definitely settled by that Code. I do not personally agree with many of its *dicta*, but I consider uniformity of such paramount importance as to render it the plain duty of every British naturalist to abide strictly by *all* its *dicta*.' Worthy ambition indeed; the Code is still venerated, but still manages to alter itself occasionally.

Oates and Blanford's great Handbook volumes of 1889-98 again included Burma, and again, like all preceding volumes, dealt only with the classification of birds down to the species level. It remained for E. C. Stuart Baker first to add subspecies names, or trinomials as they are sometimes called, to the Indian subregion avifauna. In this he followed Ernst Hartert, whose fundamental *Vögel der paläarktischen Fauna*, of 1910-22, reflected much of that changing philosophy of systematics which had been evolving since the close of the nineteenth century. The ideas, essentially held in America and in Germany at this time, produced the present concept of the polytypic species, a species consisting of a group of populations, closely related to each other, separated only by geographic boundaries, which could presumably interbreed should the barriers separating them break down, and which were far more closely related among themselves than in the case of any other *separate* species. At first these ideas presented considerable difficulty but by 1910 Hartert had been won over, and by 1920, Baker's Handlist of the Birds of the Indian Empire had begun to appear in serial parts in the *Journal of the Bombay Natural History Society*. This nomen-

¹ The author's initials are used in some cases as in this, because several Müllers have written on zoology.

clature has continued to the present day, with minor variations. The greatest changes perhaps appear between the publication of Baker's handbook, *The Fauna of British India including Ceylon and Burma*, 1922-30, and the publication of *A Synopsis of the Birds of India and Pakistan together with those of Nepal, Sikkim, Bhutan and Ceylon* in 1961. As one of us (Ripley) said in the Introduction to that volume, 'It is perhaps unfortunate but true that no such listing as this or Baker's earlier work is ever final'. We can only attempt to fill in additional small gaps in the nomenclatorial picture, at the subspecific level for the most part in systematics, or in chinks or wider gaps in the understanding of the habits of birds themselves as living things.

Naturalists, environmental biologists, epidemiologists and others including amateur bird-watchers, all tend to be highly impatient of changes in the nomenclature of birds or related vertebrates as they know them. Systematists in ornithology are particularly liable to attack if changes in established or current bird scientific names are made as a result of evolutionary study. There is a good deal to be said on both sides. On the one hand the users of names want stability and a sense of ultimate finality to be maintained at all costs. On the other, evolutionists, with whom some ecologists are today beginning to be aligned, are continually seeking for the truth of the phenomena of evolution. If in the process of delineating living and organic processes, nomenclatorial stability suffers, then suffer it must. Both sides deplore pedantic name-shufflers who collect scientific names of organisms like postage stamps and are said to extract personal prestige therefrom. These days actually would seem to be gone for ever in ornithology. Only rational trained biologists tend to be concerned with systematics nowadays, and in certain areas such as botany and entomology, *alpha* taxonomy, or the mere descriptions of natural living objects, is still a responsibility of paramount importance. In birds certainly there are few surprises around the corner. New species may continue to be found at a diminishing rate in remote corners of the globe and a few new subspecies may turn up almost anywhere. But where they do, and where they are described as *new*, it is for a secondary reason, an attempt to express reality, to show that organic processes are occurring around the clock at an appreciable rate and that change is the order of the day.

Two of the most recent subspecies of birds of our subregion have been described in 1960: *Chalcophaps indica salimalii* Mukherjee, and *Ardeola grayii phillipsi* Scheer. Additional subspecies from islands of the Bay of Bengal may appear shortly.

A more depressing corollary to our changing world is that subspecies as well as species are probably disappearing today at an accelerated rate. In some areas, particularly in the tropics, and particularly in plants and in such classes of animals as the invertebrates, many of these species and subspecies may disappear before they have even been

described as new to science, leaving no ascertainable ripple in man's time to mark their passing. Only the world's pool of genetic recombination is deprived here, not man's recording of it by ascribed names. Let us hope that biologists of the future will not know many species of the great subcontinent of southern Asia only by names as we today, by accident, commemorate the lost Dodo of Mauritius or the Solitaire. For all that they have gone, they were seen by knowing men, recorded, and their bony remnants described. In India the Pink-headed Duck was described as locally tolerably common in Oates and Blansford's day; as 'most shy and secretive' by Baker thirty-one years later; and as probably extinct by ourselves thirty-six years later still. And so in two generations, within the lifetime of many people, one of the most curious species of birds in the world has vanished. 'What's in a name?' indeed. Meanwhile the science and order of systematics continues, a service, a function to those who would use it knowledgeably, an attempt to delineate forces of nature in progress both now and *in statu nascendi*.

GLOSSARY OF TERMS FOR PHYSICAL UNITS

particularly as used in this book

| | |
|---------|---|
| bhabār | The zone or belt of alluvial loamy soil stretching along the northern edge of the dun or terai and up to c. 600 metres in the Himalayan foothills, from Kumaon in Uttar Pradesh to Assam (known as duar in northern Bengal and Assam). Supports a type of high dense forest usually containing sāl (<i>Shorea robusta</i>), sheesham (<i>Dalbergia sissoo</i>), and simul (<i>Salmania malabarica</i>). |
| biotope | A broad physiographical unit epitomizing the interaction of diverse physical factors, chiefly temperature, rainfall, and humidity. Examples: Evergreen biotope, Desert biotope. |
| duār | The easternmost section of the bhabar found in northern West Bengal, Bhutan, and adjacent Upper Assam. |
| dūn | Hummocky broken country, often broad valleys within the outer ranges of the Himalayas, that in some sections intervenes between the bhabar and terai. |
| facies | A smaller but easily recognized division of a biotope, e.g. the Sandy facies, or Rocky facies, of Desert biotope. |
| jheel | A shallow lake in a low-lying natural depression produced by rain or floods, or spillage from a river, usually with floating and underwater vegetation and reed-beds, and partially submerged trees. |
| mohālla | A special quarter of a town or village where different communities or professional groups live in virtual segregation, such as harijans, silver-smiths, and bead-sellers. |
| nullah | Watercourse or ravine, usually dry. In Hindi, <i>nālā</i> . |
| shola | A patch of montane evergreen wet temperate forest, usually in a sheltered nullah or hill stream valley amongst rolling grassy hills (or downs), from c. 1500 metres up, in South India and Ceylon. |
| terāi | The undulating alluvial, often marshy, strip of country stretching along the southern edge of the bhabar and dun south to the Gangetic Plain. The terai extends through U.P., Nepal, and northern W. Bengal to Assam. It supports 'seas' of tall elephant grass interspersed with tracts of dense forest. Large parts of it have now been cleared and drained for cultivation. ¹ |

¹ The descending order in which the different zones occur is: Himalayan foothills → bhabar (or duars) → dun → terai → Gangetic Plain.

CHANGES IN TERRITORIAL NAMES

The *Handbook* relies on observations made during the last hundred years, during which period many areas have changed their names and boundaries. The authors have striven to keep up with changes which have taken place during the writing and publication of the ten volumes, and hope the following notes will be helpful in interpretation. They should be supplemented by reference to atlases.

ANDHRA PRADESH. Until 1953 the northern half of Madras State, including the deltas of the Krishna and Godavari rivers and the arid hills of the Eastern Ghats, and the former Hyderabad State.

ARUNACHAL PRADESH. 'The Province of the Dawn.' The Himalayas east of Bhutan, including the Dafla, Abor, Miri and Mishmi hills. Before 1972 this area was the North-East Frontier Agency (NEFA), comprising the Karneng, Subansiri, Siang and Luhit frontier divisions.

ASSAM. Before 1947 this province included Arunachal Pradesh, Meghalaya, Mizoram and Nagaland (q.v.). In 1972 it was restricted to the Brahmaputra Valley.

BANGLADESH. Constituted in 1971, formerly East Pakistan. Besides the Brahmaputra plains it includes the Chittagong Hill Tracts in the south.

BENGAL. Prior to 1947 the Ganges-Brahmaputra delta area, later divided into Bangladesh (q.v.) and West Bengal.

HARYANA. The fertile plains area north and west of Delhi, formerly part of the Punjab (q.v.).

HIMACHAL PRADESH. 'The Snowy Province.' The Himalayan hill States were united under this name in 1948, and in 1966 the area was enlarged by the hill regions of the Punjab.

KARNATAKA. The official name of Mysore since 1973.

LAKSHADWEEP. The official name of the Laccadive Islands group since 1973.

MEGHALAYA. 'Cloud-land.' The Garo, Jaintia, Khasi and Cachar hill districts, constituted a separate State in 1972.

MIZORAM. The Lushai or Mizo Hills area, constituted a separate State in 1972.

NAGALAND. The Naga Hills area, constituted a separate State in 1962.

NEFA. Now Arunachal Pradesh, q.v.

OUDH (= Awadh). The eastern Gangetic plains, now part of Uttar Pradesh ('Northern Province'), the name given in 1950 to the United Provinces (of Agra and Oudh).

PAKISTAN. Before 1972 West Pakistan, including Sind, Baluchistan, Punjab (q.v.), the North-West Frontier Province and Bahawalpur.

PUNJAB. Prior to 1947 the whole of the northern plains area watered by the Indus, and its five tributaries namely Jhelum, Chenab, Ravi, Beas and Sutlej. Divided in 1947 into West Punjab (Pakistan) and East Punjab (India). In 1966 East Punjab was further divided into Punjab, Haryana and Himachal Pradesh (q.q.v.).

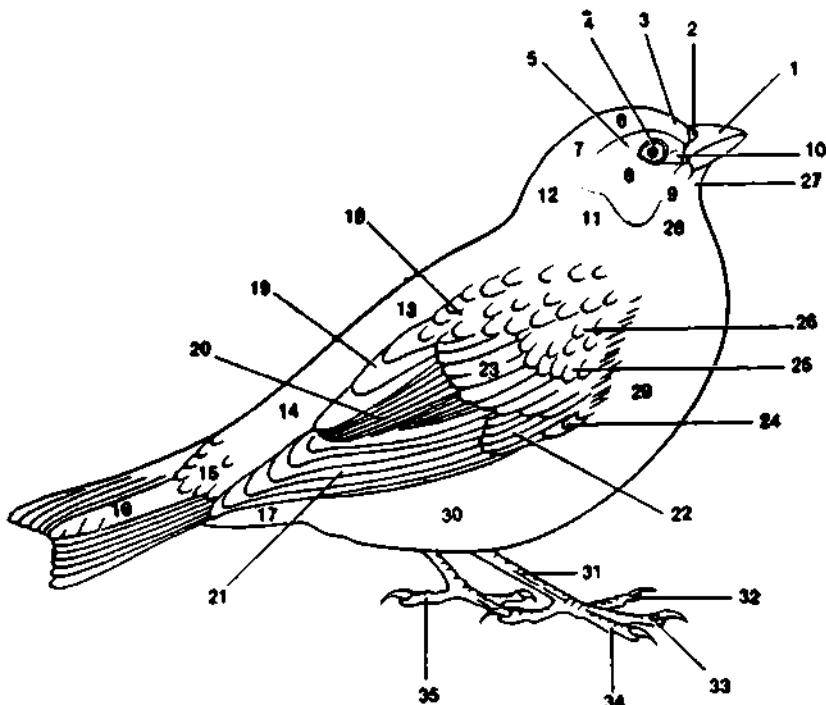
SAURASHTRA. The union of States was merged with Bombay in 1956 and since 1960 has been part of Gujarat.

SRI LANKA. The official name of Ceylon since 1972.

TAMIL NADU. The name given to Madras State in 1969.

Terms used in the description of a bird's plumage and parts

Topography of a sparrow



- | | |
|--|----------------------------|
| 1 Culmen | 18 Scapulars |
| 2 Nostril | 19 Tertiaries |
| 3 Forehead | 20 Secondaries } (remiges) |
| 4 Iris | 21 Primaries } |
| 5 Supercilium | 22 Primary coverts |
| 6 Crown | 23 Greater coverts |
| 7 Nape | 24 Bastard wing (alula) |
| 8 Ear-coverts | 25 Median coverts |
| 9 Malar region (malar stripe, moustache) | 26 Lesser coverts |
| 10 Lores | 27 Chin |
| 11 Side of neck | 28 Throat |
| 12 Hindneck | 29 Breast |
| 13 Back | 30 Belly (abdomen) |
| 14 Rump | 31 Tarsus |
| 15 Upper tail-coverts | 32 Inner toe |
| 16 Tail (rectrices) | 33 Middle toe |
| 17 Under tail-coverts | 34 Outer toe |
| | 35 Hind toe (hallux) |

ABBREVIATIONS

| | |
|-----------|--|
| Bull. BOC | <i>Bulletin of the British Ornithologists' Club</i> |
| CBCN | <i>Ceylon Bird Club Newsletter</i> |
| FBI | <i>Fauna of British India, Birds</i> |
| INB | <i>Newsletter for Birdwatchers, India</i> |
| J. Orn. | <i>Journal für Ornithologie, Berlin</i> |
| JBNHS | <i>Journal of the Bombay Natural History Society</i> |
| PZS | <i>Proceedings of the Zoological Society, London</i> |
| SF | <i>Stray Feathers</i> |
| SZ | <i>Spolia Zeylanica</i> |

Abbreviated references to persons frequently quoted

| | |
|------------------|------------------------------------|
| Abdulali or HA | Humayun Abdulali |
| Alexander | W. B. Alexander |
| Amadon | Dean Amadon |
| Baker | E. C. Stuart Baker |
| Biswas or BB | Biswamoy Biswas |
| Delacour | Jean Delacour |
| Donald | C. H. Donald |
| Gibson-Hill | C. A. Gibson-Hill |
| Hartert | Ernst Hartert |
| Hume | A. O. Hume |
| Inglis | C. M. Inglis |
| Jerdon | T. C. Jerdon |
| Jones | A. E. Jones |
| Legge | Col. W. Vincent Legge |
| Ludlow | Frank Ludlow |
| Magrath | Major H. A. F. Magrath |
| Marshall | Cols. C. H. T. & G. F. L. Marshall |
| Mayr | Ernst Mayr |
| Meinertzhagen | Col. R. Meinertzhagen |
| Murphy | R. C. Murphy |
| Osmaston or BBO | B. B. Osmaston |
| Peters | J. L. Peters |
| Phillips | W. W. A. Phillips |
| Ripley or SDR | S. Dillon Ripley |
| Sálim Ali or SA | Sálim Ali |
| Scully | John Scully |
| Stevens | Herbert Stevens |
| Stresemann | Erwin Stresemann |
| Ticehurst or CBT | Claud B. Ticehurst |
| Whistler or HW | Hugh Whistler |
| Whitehead | Lt C. H. T. Whitehead |

Order GAVIIFORMES

Family GAVIIDAE: Divers, Loons

Aquatic birds superficially like grebes but differing in a number of characters and probably not very closely related to them. Toes fully webbed like duck's, not lobed or scalloped. Wing of 11 primaries, the outermost minute. Rectrices 18 or 20, short but well developed. Plumage dense, compact and rather harsh, not silky as in grebes. Tarsi reticulate, laterally compressed. Legs short and set far back, almost at end. Wings short, narrow, and tapering; set well back as in a Boeing jet plane. Sexes alike.

For other anatomical characters see Stresemann 1927-34, Aves : 779-80 ; Witherby et al. 1940, 4: 111 ; Palmer 1962, 1: 20.

Genus GAVIA J. R. Forster

Gavia J. R. Forster, 1788, Enchrid. Hist. Nat.: 38. Type, by subsequent designation,
Colymbus Immer Brünnich

Characters as of the Family. Genus northern Holarctic.

Key to the Species

| | Page |
|---|------------------------------|
| A Bill straight | 1 |
| B Bill upturned | 2 |
| 1 Upperparts uniformly dark | <i>G. arctica</i> (winter) |
| Upperparts 'scaly' | <i>G. arctica</i> (juvenile) |
| 2 Upperparts sprinkled with white spots | <i>G. stellata</i> (winter) |

1. Blackthroated Diver. *Gavia arctica suschkini* (Zarudny)

Urinator arcticus suschkini Zarudny, 1912, Orn. Mitt. 3: 11 (Russian Turkestan)

Baker, FBI No. 2293, Vol. 6: 485

LOCAL NAMES. None recorded.

SIZE. Domestic duck ±; length c. 65 cm. (25 in.).

FIELD CHARACTERS. A practically tailless aquatic bird, in winter dark grey above white below without black throat. Pointed straight bill. Overall aspect that of Little Grebe or Dabchick, but much larger and heavier. Neck stouter and proportionately shorter than grebe's. Confusable only with the commoner Crested Grebe, but larger size, stouter neck, and absence of ruff of elongated feathers below head diagnostic. Sexes alike.

STATUS, DISTRIBUTION and HABITAT. A rare vagrant in winter. Only once recorded: a single specimen on flooded land bordering the W. Jumna Canal at Jagadhri, Ambala District, Punjab — 19 February 1922 (A. E. Jones 1922, JBNHS 28: 1134).

EXTRALIMITAL. Breeding from the Ural Mts to Lake Baikal and the Yenisey, Turkestan, and Kirghiz Steppes.

MIGRATION. ?

PODICIPITIFORMES

GENERAL HABITS. Swims low, often only with the head showing. Rises from water with effort, running long distances on surface with quick-flapping short wings, but is a swift and powerful flier once air-borne. Hunchbacked merganser-like profile in flight with legs projecting behind distinctive. Hits water with chest when landing; cannot take off from dry land. Expert deep-water diver and submarine swimmer, using feet as propellers and wings to turn and twist. Keeps to inland lakes.

FOOD. Mainly fish.

VOICE AND CALLS. ?

BREEDING. Extralimital.

MUSEUM DIAGNOSIS. For plumage etc. see Witherby *et al.* 1940, 4: 119. This race, *suschkini*, differs only in details from the nominate race there described.

The Ambala specimen, a first-year female, had a wing measuring 290 mm. Hartert (1920: 1461) gives the wing measurements of this race as 291–337 mm.

[2. The Redthroated Diver, *Gavia stellata* (Pontoppidan), has been recorded once from the Makran Coast (Baker 1931, 8: 703). It conceivably may occur again as a vagrant in West Pakistan.]

Order PODICIPITIFORMES

Family PODICIPITIDAE: Grebes

Aquatic birds with soft rudimentary tail, very small wings, and compressed sharply pointed bill. Legs placed far back, especially adapted for swimming and diving. Tarsi scutellated in front, laterally compressed. Front toes with broad lateral vane like lobes. Hind toe small, raised, vertically lobed. Nails broad and flattened. Plumage dense and silky. Primaries 12, the 1st from the outside (= ascendant) being rudimentary. Sexes alike. Downy young boldly striped blackish and white.

For further anatomical details see Witherby *et al.* 1940, 4: 84; Stresemann 1927–34 Aves: 780–82; Palmer 1962, 1: 62.

Genus PODICEPS Latham

Podiceps Latham, 1787, Gen. Syn. Bds., Suppl., 1: 294. Type, by subsequent designation, *Colymbus cristatus* Linnaeus

Characters as of the Family. Genus cosmopolitan; represented within our limits by three species.

Key to the Species

| | Page |
|--|--------------------------------|
| A Size of duck (c. 50–60 cm. = 19·5–23·5 in.) | 1 |
| B Smaller than duck (c. 23–35 cm. = 9–13 in.) | 2 |
| 1 Long slender neck with straight bill, head ornamented with backward pointing tufts above and a ruff or ruff of black chestnut feathers below | <i>P. cristatus</i> (breeding) |
| Head ornamentation reduced or lacking, white above eye conspicuous, bill pinkish | <i>P. cristatus</i> (winter) 3 |

| | | |
|---|---|---------------------------------------|
| 2 | Needle-like bill with slightly upturned appearance..... | a |
| | Bill rather thick and straight..... | b |
| a | Head and neck black, tufts of golden brown feathers on sides of head..... | 5 <i>P. nigricollis</i> (breeding) |
| | Head and neck dark greyish black; white of throat extending around nape..... | 5 <i>P. nigricollis</i> (winter) |
| b | Cheeks and lower throat chestnut, cap and back of neck greyish black, upper throat black..... | 6 <i>P. ruficollis</i> (breeding) |
| | Sides of head and foreneck pale rufous, cap darker, upper throat white..... | 6 <i>P. ruficollis</i> (winter) |

3. Great Crested Grebe. *Podiceps cristatus cristatus* (Linnaeus)

Colymbus cristatus Linnaeus, 1758, Syst. Nat., ed. 10, 1: 35 (Sweden)

Baker, FBI No. 2290, Vol. 6: 477

Plate 1, fig. 9, facing p. 16

LOCAL NAME. *Shiva-häns* (Assam).

SIZE. Domestic duck — ; length c. 50 cm. (c. 19 in.).

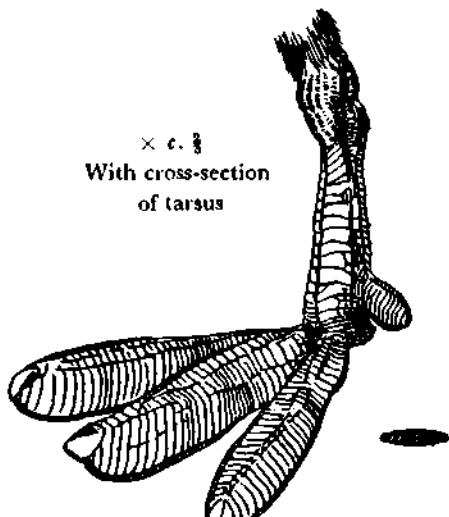
FIELD CHARACTERS. A tailless aquatic bird dark greyish brown above, silky white below, with slender longish neck and pointed bill. Two upstanding, backwardly directed blackish ear-tufts above head and a frill or ruff (looking like puffed-out throat) of chestnut-and-black elongated feathers below the head, conspicuous and diagnostic; less developed in female than male. In winter (non-breeding plumage) these 'ears' much reduced; in young birds absent. A white wing patch (secondaries) and white leading edge of wing concealed at rest, conspicuous in flight, when humpbacked profile is reminiscent of Merganser. Sexes alike. Singly, pairs, and small scattered parties on jheels and littoral waters.

STATUS, DISTRIBUTION AND HABITAT. Winter visitor in small numbers to northern India from Sind (where it is commoner at sea along the coast) to NE. Assam and Manipur; south through Rajasthan (Bharatpur) to Gujarat on the west (Kutch, Porbandar, Jasdan, Viramgam, Bhavnagar), and Orissa on the east (near Puri — sight record, H. G. Alexander). Affects jheels and littoral waters.

EXTRALIMITAL. The Palearctic Region — Europe to China and Japan, south to our limits in Ladakh, Kashmir and Nepal.

MIGRATION. No specific information.

GENERAL HABITS. Usually seen in separated pairs or scattered parties on vegetation-covered reed-bordered jheels swimming about with neck



PODICIPEDIFORMES

erect. When alarmed, disappears smoothly or with a little leap and swims away under water; surfaces then dives again, and so on till it gains the safety of distance and open water. Is loth to fly, rising with effort, pattering along the surface for long stretches, half running half flying till airborne. But is capable of covering long distances on migration or when shifting from one jheel to another. Flight swift though seemingly laboured, with rapid flaps of the short wings. Seldom seen on land, where the backwardly placed legs enable it merely to shuffle along clumsily with breast on ground. Courtship display, first described by J. S. Huxley (1914, PZS: 491-562), consists of the pair facing each other with rigid neck, ear-tufts erect and ruff expanded, both birds diving and coming up with water weeds in their bills, suddenly rising upright breast to breast and swaying — and variations of this theme.

FOOD. Fish, tadpoles, frogs, water insects, etc., with some vegetable matter. Stomachs of three specimens collected by Meinertzhagen in Ladakh contained exclusively freshwater shrimps (*Gammarus*). A quantity of feathers has frequently been reported among the stomach contents.

VOICE and CALLS. Described as a harsh *krek-krek* and a variety of discordant barks and shrill trumpeting expressive of different emotions.

BREEDING. Within our limits recorded from Khushdil Khan lake in Baluchistan (alt. c. 1750 m.) and from the high-elevation lake Tso Kar in Rupshu, Ladakh (alt. c. 5200 m.). In W. Tibet SA found it nesting on Ding Tso lake (alt. c. 5300 m.) NE. of Manasarovar. Season, chiefly June to August. Nest, a conspicuous mass of water weeds c. 45 to 60 cm. in diameter with a depression in the middle, on floating mounds of grass and rubbish 20 to 100 metres from the bank, loosely anchored to growing weeds. Often clusters of several nests together, from a few metres apart to almost touching one another. Eggs, 3 to 5, very pale sea-green with an overlay of chalky white calcium deposit, usually becoming stained brown by contact with the soggy nest. Fourteen eggs taken by Ludlow on the Kala Tso in Tibet average 54.50 × 25.00 mm. Compared with the average size of 100 British-taken eggs as given by Witherby (54.8 × 36.7 mm.) they are considerably narrower. Both parents incubate. Ludlow observed that the male frequently sat on the nest alongside of the brooding female. The incubation period is recorded as 28 days. When leaving the nest to feed, or on alarm, the sitting bird usually covers up the eggs with loose nest material.

From the fact that a few pairs may usually be seen on the great swamps north of the Brahmaputra river in Assam during the breeding season every year, Baker (1932-5, 4: 518) surmises that they breed there sporadically and maybe even regularly. Bulkley (JBNHS 6: 501) found a nest near Kharaghoda, Gujarat, in August 1891, and there is some indirect evidence that odd pairs may also breed irregularly in Gujarat and Saurashtra.

MUSEUM DIAGNOSIS. For description of plumages etc. see Witherby 1940, 4: 91.

MEASUREMENTS. Three specimens collected by Meinertzhagen in Ladakh measure:

| | Wing | Bill (from feathers) |
|------|----------|-------------------------|
| 2 ♂♂ | 202, 203 | 43, 45 mm. |
| 1 ♀ | 192 | 41 mm. |

Baker, loc. cit., gives range for ♂ ♀ W. 176–211; Culm. 45–53; Tar. 52–64 mm.

COLOURS OF BARE PARTS. ‘Iris carmine-red, crimson with a narrow inner ring of orange, or orange with an inner ring of pale yellow; bill dark brown, the tip paler and slaty grey, the extreme base suffused with crimson, obsolete in winter; legs and feet olive-green externally, yellowish-green inside; webs yellowish, the nails bluish.’

3a. **Rednecked Grebe.** *Podiceps griseigena* (Boddaert). See Appendix.

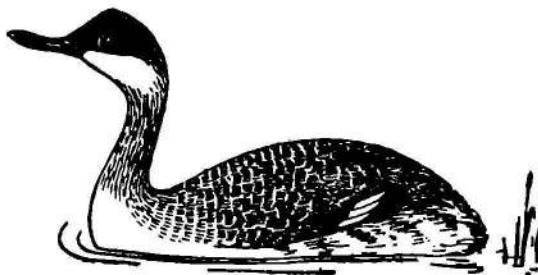
4. **Blacknecked Grebe.** *Podiceps nigricollis nigricollis* Brehm

Podiceps nigricollis Brehm, 1831, Handb. Naturg. Vog. Deutschl.: 963 (E. Germany)
Baker, FBI No. 2291, Vol. 6: 480

LOCAL NAMES. Unrecorded.

SIZE. Dabchick+; length c. 33 cm. (13 in.).

FIELD CHARACTERS. Distinguished from the familiar Dabchick or Little Grebe in winter by larger size and the silvery white flanks, flashing in good light. Sexes alike.



Winter plumage, \times c. $\frac{1}{2}$

Adult (winter). *Above*, dark brown with darker (blackish) cap to below eyes. *Below*, chin and throat mixed black and white, foreneck dark brown, rest of underparts white. No dusky brown on flanks. Bill slender, pointed, slightly upturned in profile. In summer plumage has black head and neck and lengthened rufous-golden feather tuft from below eye.

STATUS, DISTRIBUTION and HABITAT. Uncommon winter visitor, sporadically recorded in Baluchistan (nr. Quetta), Sind (Karachi, Makran Coast littoral, Manchar Lake), Punjab (Bahawalpur), Uttar Pradesh (Pyagpur), Maharashtra (near Poona), Nepal (R. L. Fleming, 1957, *Fieldiana, Zool.* 41(1): 48). Possibly occurs more generally in northern India than is identified. Recently (winter 1964–5) reported on Khabakki lake, W. Pakistan Salt Range, in gatherings of 300 to 600 individuals, vastly outnumbering *Podiceps ruficollis* (C. D. W. Savage, *in epist.*). On duck-shooting jheels.

Extralimital. Breeds in the Palaearctic Region from Europe to China and Japan, south to Turkestan.

MIGRATION. ?

GENERAL HABITS. Frequents reed-bordered jheels with floating vegetation interspersed with expanses of open water, in company with dabchicks. Prefers reedbeds in the shallows to open water, and is inclined to segregation. Otherwise very similar to the dabchick.

PODICIPEDIFORMES

FOOD. Fish, tadpoles, shrimps, aquatic insects, etc., with which a quantity of feathers (its own?) is usually taken.

VOICE and CALLS. Unrecorded in India.

BREEDING. Within our limits recorded only from Baluchistan (Khushdil Khan lake near Quetta) where Meinertzhagen found over 70 nests with eggs on 20 June 1913. *Season*, June-July. *Nest*, a floating pad of weed stalks, c. 37–43 cm. across, firmly attached to the bottom as shown by all the above nests drowning on rise of water level in flood. Sited in reedbeds, not open water as with Crested Grebe. *Eggs*, 3–5, like the latter's but smaller. Average size c. 44 × 32 mm. Both parents brood. Incubation period recorded as 19–20 days. Small striped downy young often carried on swimming parent's back, cradled between slightly raised wings, sometimes even when parent dives. Newly hatched young often nestled in fluffy plumage of back of incubating parent to keep away from soggy nest, and fed by other parent in this position (W. Wüst, *J. Orn.*, 1934: 311–18).

MUSEUM DIAGNOSIS. For description of plumages etc. see Witherby 1940, 4: 105–6.

MEASUREMENTS

| | Wing | Bill (from feathers) | Tarsus |
|-----|---------|-------------------------|--|
| ♂ ♀ | 123–137 | 39–43 | c. 20–26, generally 21–24 mm. (Baker) |

Wing of a ♂ from Poona in BNHS Coll. 142 mm.

COLOURS OF BARE PARTS. Iris reddish brown to orange-pink with silvery inner ring round pupil. Bare loral skin, brownish flesh. Bill bluish plumbeous, black on ridge of culmen, whitish at tip. Legs and feet blackish and greenish to bluish.

MISCELLANEOUS. Longevity (from ringing data) 6+ years (*Ring*, 1962, 33: 148).

5. Little Grebe or Dabchick. *Podiceps ruficollis capensis* Salvadori

Podiceps capensis Salvadori, 1884, Ann. Mus. Civ. Genova (2), I: 252 (Shoa, Africa)

Baker, FBI No. 2292, Vol. 6: 481

Plate 1, fig. 10, facing p. 16

LOCAL NAMES. *Pāndubi*, *Pāntiri*, *Dūbdūbi*, *Churaka* (Hindi); *Dūbdūbi*, *Pāndubi*, *Dūbūri* (Bengal); *Munu-quidi-kodi* (Telugu); *Makkūlippān*, *Tānni pūlū* (Tamil); *Pind* (Kashmir); *Tūhino* (Sind)

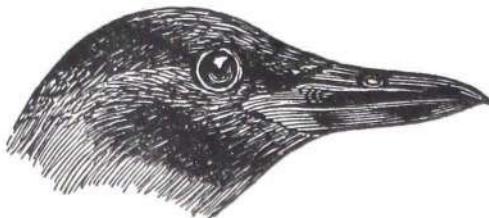
SIZE. Tailless pigeon ±; length c. 23 cm. (9 in.).

FIELD CHARACTERS. A small squat tailless aquatic bird with short pointed bill and backwardly placed legs specially adapted for swimming and diving. Rides on the water with rear end raised and fluffed out producing a bluntly rounded effect.

Adult. *Above*, dark brown, the crown darker; sides of head, throat and neck chestnut. *Below*, silky smoky white with the flanks dusky brown (contra *P. n. nigricollis*). A white patch on wing (secondaries) conspicuous only in flight. Base of bill and swollen fleshy gape yellowish green, prominent. In non-breeding plumage, mostly in winter, a drab brown bird with whitish chin, pale rufous neck and whitish underparts. Sexes alike.

STATUS, DISTRIBUTION and HABITAT. Chiefly resident, but shifting locally and long distances dependent on drought and flood. Part of populations

possibly also migratory. Common throughout the Indian subcontinent, east to Assam and Manipur, south into Ceylon, from the plains to c. 1800 m. altitude (in Kashmir). Absent in the Andaman and Nicobar islands. Frequents all types of inland waters with or without floating vegetation or reeds — irrigation reservoirs, village tanks, ponds, moats of ancient forts, etc., even flooded roadside ditches and borrow-pits. Hardly ever rivers or the sea.



$\times \text{ c. } 1$

Extralimital. Our race *capensis* occurs in much of N. Africa, Madagascar Middle East, and SE. Asia.

MIGRATION. Unknown, but an exhausted specimen picked up on Jakko Hill, Simla (c. 1500 m.) — quite out of its normal range — on 17 September 1942 (A. E. Jones, JBNHS 43: 661) seems clearly suggestive of migratory movement.

GENERAL HABITS. Usually keeps in separated pairs or small scattered parties. Enormous gatherings of hundreds strong may commonly be met with on the bigger jheels such as the Manchar lake in Sind, and the Logtak in Manipur (Assam). Also on the 'Salt Lakes' near Calcutta. An excellent diver and underwater swimmer. Disappears smoothly below the surface without leaving a ripple, or takes a little upward leap to plunge vertically with astonishing suddenness. After being fired at once, will often vanish before the charge of shot can reach it a second time! The birds are fond of disporting themselves at sunset, chasing one another, pattering on the surface half running half flying with rapid flapping (vibrating) of the diminutive wings, to the accompaniment of shrill tittering or trilling duets and choruses. They are loth to fly, and when alarmed will either dive for safety or patter along and fly a short distance close to the surface presently to flop down again. Once properly airborne, however, they can fly incredibly well and strongly, and often travel long distances.

FOOD. Fish, frogs, tadpoles, crustacea, molluscs, aquatic insects, etc. As in other grebes some feathers also swallowed. Food mostly procured by diving, but also on surface from under floating vegetation by swift spurts forward, neck outstretched, to seize escaping quarry.

VOICE AND CALLS. In addition to the runs of shrill, rather musical trilling, a sharp monosyllabic *click* is uttered repeatedly when agitated, as on approach of nest by intruder; and also sharp squeaks like an unoiled bicycle wheel.

BREEDING. Season varies in different parts of the country depending on rainfall and availability of suitable breeding waters; chiefly April to October in northern and peninsular India, December to February in the

south and in Ceylon. *Nest*, a rough pad of sodden weeds and rushes, c. 30 cm. across the top of the shallow central depression. Floating or bedded on water weeds, and usually anchored to the reeds or substrate; often in clusters or colonies partly submerged and liable to drown by flood. It has been noted (Williams, JBNHS 33: 619) that the temperature of the water round the eggs within a half-submerged nest is higher than that of the lake, perhaps as a result of the fermentation of the soggy nest material. This may prevent chilling of the eggs and account for the birds being able to leave them unattended for long periods. Copulation usually takes place on the nest when the female is sitting on it. *Eggs*, 4 or 5, sometimes 3 or 6, rather pointed at both ends, chalky white becoming stained dirty brownish during incubation by contact with the sodden nest. Average size c. 36 × 25 mm. The birds cover up the eggs with loose nest material every time they leave the nest. Both sexes incubate, and tend the young. Incubation period recorded as 19–20 days. Two (or more?) broods are raised in succession. When the female is incubating the second clutch, the care of the first brood of downy young devolves entirely on the male.

The downy striped and spotted hatchlings can swim almost as soon as hatched, but dive when a day (?) old clumsily with a splash, remaining submerged only for a short time. When first venturing forth from the nest they hold on with the bill to the parent's flank feathers at the rear and are thus towed along. On scenting danger the parent gives the tittering alarm note, at the same time partly raising its wings and dipping its posterior. The chicks clamber up the incline and ensconce themselves between the scapulars and are carried away to safety.

MUSEUM DIAGNOSIS. For details of plumages of the nominate race *ruficollis* see Witherby 1940, 4: 109–11. Our race *capensis* differs from it in having white bases to the primaries and more white on the secondaries.

MEASUREMENTS

| | Wing | Bill (from feathers) | Tarsus | Tail |
|-----|--------|-------------------------|---------------|-------------------|
| ♂ ♀ | 94–109 | 18–22 | 30–35 (Baker) | c. 23–33 mm. (SA) |

COLOURS OF BARE PARTS. Iris reddish brown or deep red, or orange yellow, with a circle of fine brown spots round pupil. Bill in adult black, the extreme tip pale and the base and gape (swollen) yellow or greenish yellow; in downy young cherry red. Legs and feet greenish black or black.

Order PROCELLARIIFORMES

Key to the Petrels, Shearwaters and Storm Petrels (Procellariidae and Hydrobatidae) recorded in Indian waters

| | Page |
|--|---------------------------------|
| A Large-sized (c. 50 cm. = 19½ in.), dark above and below, bill pale fleshy white..... | <i>Procellaria carneipes</i> 11 |
| B Large-sized (c. 40–48 cm. = 15½–19 in.), dark above and white below | 1 |
| C Medium-sized (c. 36 cm. = 14 in.), with dark head, chequered upperparts, and white underparts..... | <i>Daption capense</i> 10 |

| | | |
|---|--|----|
| D | Medium-sized (c. 33-36 cm. = 13-14 in.), dark above and below | 2 |
| E | Small-sized (c. 17.5-28 cm. = 7-11 in.), dark above and below..... | 3 |
| F | Small-sized (c. 19-31 cm. = 7½-12 in.), generally dark above with some white in plumage | 4 |
| 1 | White face streaked with black, upperparts scale-like in appearance, (c. 40-48 cm. = 15½-19 in.) <i>Procellaria leucomelaena</i> | 11 |
| | Uniformly dark above, white below (light phase) or all dark (dark phase), tail cuneate (c. 42-48 cm. = 16½-19 in.)..... | |
| | <i>Procellaria pacifica chlororhyncha</i> | |
| 2 | Bill dark brown, body feathers paler below than above, tail short and rounded (c. 33 cm. = 13 in.)..... <i>Procellaria tenuirostris</i> | 13 |
| | Bill very stout and black (c. 36 cm. = 14 in.)..... <i>Bulweria aterrima</i> | 15 |
| 3 | Bill short (c. 29 mm.), tail long, wedge-shaped, feet flesh-coloured | |
| | <i>Bulweria fallax</i> | 15 |
| | Dark all over, wedge-shaped tail, pale legs (c. 25-28 cm. = 10-11 in.) | |
| | <i>Bulweria bulwerii</i> | 16 |
| | Dark all over, smaller, forked tail (c. 17.5-19 cm. = 7-7½ in.)..... | |
| | <i>Oceanodroma leucorhoa monorhis</i> | 21 |
| 4 | Sooty black above with white underparts, dark colour of back extending to sides of breast (c. 29-31 cm. = 11½-12½ in.)..... | |
| | <i>Procellaria therminieri bailloni</i> | 13 |
| | Sooty black above with white rump, underparts white with black band running longitudinally along middle of belly through under tail-coverts (c. 20.5 cm. = 8 in.)..... <i>Fregata tropica melanogaster</i> | 20 |
| | Dark all over with white rump, pale wing-bar, square tail, and yellow webs of toes (c. 19 cm. = 7½ in.)..... <i>Oceanites oceanicus oceanicus</i> | 17 |

Family PROCELLARIIDAE: Petrels, Shearwaters

Sea birds of very diverse sizes and coloration, almost from goose to myna, and white, grey, brown, or black plumage or combinations of these. Bill short and stout to longish and slender, covered with horny plates, hooked at tip. Nostrils tubular. Wings narrow, long, and pointed with first primary longest, and secondaries short. Tarsus short to medium, slender, laterally compressed, reticulated. Feet webbed, with strong hindclaw. Tail short, rounded. Sexes alike.

Genus DAPTON Stephens

Daption Stephens, 1826, in Shaw's Gen. Zool. 13(1): 239. Type, by original designation, *Procellaria capensis* Linnaeus

Bill short, stout, gonyx angulate near the end, and the extremity inclined upward. Nostrils divided within the tube but terminating in a single orifice. Wings long: 1st quill (as.) longest; secondaries short. Tail of 14 feathers rather short, slightly rounded at end. Tarsus slender, reticulate, somewhat compressed and shorter than the middle or outer toe; hindclaw stout.

Contains only a single species.

6. **Cape Petrel.** *Daption capensis* (Linnaeus)

Procellaria capensis Linnaeus, 1758, Syst. Nat., ed. 10, 1: 32 (Cape of Good Hope)
Baker, FBI No. 2201, Vol. 6: 307

OTHER NAME. Cape Pigeon.

SIZE. Pigeon; length c. 36 cm. (c. 14 in.).

FIELD CHARACTERS. A black and white pelagic petrel with a dark head, conspicuously chequered back, and two large roundish white patches on upper surface of each wing.



$\times c. \frac{1}{10}$

Adult. *Above*, head, neck, and upper back sooty brown. A small white streak below eye. Rest of back white with black spots producing a chequered effect. Tail white with broad black terminal band. *Below*, white, including under surface of wings. Sexes alike.

STATUS, DISTRIBUTION and HABITAT. Breeds in the Antarctic zone; ranges widely over the southern circumpolar oceans. Said to be one of the commonest petrels in the southern hemisphere, often following ships to pick up garbage thrown overboard.

The sole record for our area is a specimen obtained in the Gulf of Manaar, between Ceylon and the Indian mainland (Hume, *Ibis* 1870: 438 and *Stray Feathers* 7: 463), now in the British Museum.

MUSEUM DIAGNOSIS. For description of plumages, measurements, moults and biology, see Murphy 1936: 601–10.

MEASUREMENTS

| | Wing | Bill | Tarsus | Tail |
|-----|---------|-------|--------|------------|
| ♂ ♀ | 240–268 | 29–32 | 42–46 | 92–108 mm. |

COLOURS OF BARE PARTS. Iris brown. Bill black, the skin between the rami red. Legs and feet black.

Genus PROCELLARIA Linnaeus

Procellaria Linnaeus, 1758, Syst. Nat., ed. 10, 1: 131. Type, by subsequent designation, *Procellaria aequinoctialis* Linnaeus (Gray, 1840, cf. *Ibis*, 1949: 512)

Cf. Phillips, W.W.A. 1951, *Spolia Zeylanica* 26(2): 151–3.

Bill long, slender, compressed, much hooked at the point and with both mandibles turning down at tip. Nostrils tubular ending in two distinct oblique orifices ('double-barrelled') directed forward and upward, with a broad division between them. Wings long and pointed: 1st primary (as.) longest. Tail of 12 feathers, rather long and graduated. Tarsus reticulated, compressed and sharp in front; shorter than the middle and outer toes which are subequal. A small hindclaw.

Oceanic birds of moderate size.

7. Whitefronted or Streaked Shearwater. *Procellaria leucomelaena*
Temminck

Procellaria leucomelas Temminck, 1835, Planch. Col. d'Ois. livr. 99: 597

(Seas of Japan and Nagasaki Bay)

Baker, FBI No. 2199, Vol. 6: 306

SIZE. Brownheaded Gull ±; length c. 48 cm. (c. 19 in.).

FIELD CHARACTERS. Pelagic. Recognized by its white face streaked with black.

Adult. *Above*, dark brown with black wings and tail. *Below*, white, including under surface of wings. Sexes alike.

STATUS, DISTRIBUTION and HABITAT. North Pacific Ocean from Korea and Japan south in winter to Philippine Is., Borneo, Moluccas and New Guinea. Breeds in colonies on small offshore islands, e.g. in Japan, in burrows excavated in earthen hillsides.

Only one record for our area — a specimen taken at Mt Lavinia, Ceylon, in 1884. (Skin in British Mus.)

MUSEUM DIAGNOSIS. For details of plumage, breeding etc. see Hachisuka 1932: 252; breeding biology Austin and Kuroda 1953: 304.

MEASUREMENTS

| | Wing | Bill (from feathers) | Tarsus | Tail |
|-----|---------|-------------------------|--------|------------------------|
| ♂ ♀ | 305-339 | 48-53 | 46-54 | 131-150 mm. (Baker) |

COLOURS OF BARE PARTS. Iris dark brown. Bill dark horn-colour. Legs and feet flesh-colour, the outer toe darker (Baker).

8. Pinkfooted Shearwater. *Procellaria carneipes* (Gould)

Puffinus carneipes Gould, 1844, Ann. & Mag. Nat. Hist. 13: 365

(small islands off Cape Leeuwin, West Australia)

Baker, FBI No. 2198, Vol. 6: 305

SIZE. Brownheaded Gull ±; length c. 50 cm. (c. 20 in.).

FIELD CHARACTERS. Pelagic.

Adult. *Above* and *below* dark sooty brown or chocolate-black; sides of head and neck paler greyish brown. Pale fleshy bill and feet. Sexes alike.

STATUS, DISTRIBUTION and HABITAT. 'Indian and Pacific oceans from the Australian seas north in the (southern) winter to Ceylon, Japan, California....' (Alexander 1955: 23-4). Breeds on islands off southwestern Australia and northern New Zealand, and at Lord Howe Island. Within our area two specimens taken in Ceylon, one in 1879 (Wait 1931: 413), the other in 1945 (Osman Hill 1945, JBNHS 45: 239-40). More recently small numbers observed in the Maldives Islands in July (Phillips 1958, JBNHS 55: 216).

MUSEUM DIAGNOSIS. For description of plumages, biology, etc. see Murphy 1936: 658.

MEASUREMENTS

| | Wing | Bill (from feathers) | Tarsus | Tail |
|-----|---------|-------------------------|----------|-------------|
| ♂ ♀ | 299-316 | 41-46 | c. 52-56 | 137-148 mm. |

COLOURS OF BARE PARTS. Iris brown. Bill, feet and legs flesh colour, the tip of both mandibles dusky and darker (Baker).

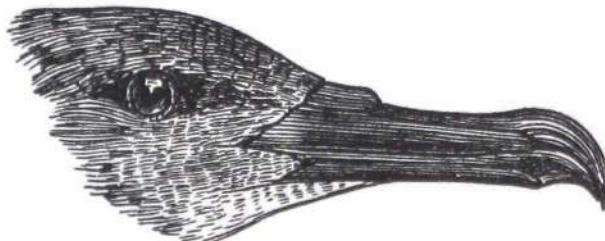
9. Wedgetailed Shearwater. *Procellaria pacifica chlororhyncha* (Lesson)

Puffinus chlororhynchos Lesson, 1831, Traité d'Orn., Livr. 8: 613
(Sharks Bay, Western Australia)

Baker, FBI No. 2196, Vol. 6: 303 (= *Puffinus pacificus hamiltoni* Mathews)

SIZE. Brownheaded Gull ±; length c. 48 cm. (c. 19 in.).

FIELD CHARACTERS. Pelagic. *Above*, dark chocolate-brown, primaries and wedge-shaped tail black. Face and throat dark brownish grey. *Below*, dimorphic, greyish brown (dark phase), or white (light phase). Sexes alike.



× c. 1

STATUS, DISTRIBUTION and HABITAT. Warmer parts of the Indian and Pacific oceans. Breeding at Seychelles, Mauritius, Fouquet, and Rodriguez; ranging widely over the western Indian Ocean. From within our area 4 specimens, all taken on the W. coast of Ceylon, are in the Colombo Museum. An old sight record at Trincomalee by Col. Legge (Wait 1931: 412) and another by W. W. A. Phillips at Colombo in 1949 (1950, JBNHS 49: 289). According to the latter this shearwater is probably a regular summer visitor to coastal Ceylon. He found it (presumably this same race, *chlororhyncha*, plentiful in the Maldives Islands in early July (1958, JBNHS 55: 216). Cumming's record from the Makran Coast of Baluchistan was shown by Ticehurst (1940, JBNHS 32: 89) to be erroneous, but this shearwater may well turn up along the coast of West Pakistan.

BREEDING. For breeding biology see Murphy 1936, and Murphy, Niedrach & Bailey 1954: 30.

MUSEUM DIAGNOSIS. For details of plumages, races, etc. see Murphy 1951: 1-21; Hachisuka 1932: 253.

MEASUREMENTS

| | Wing | Bill (from feathers) | Tarsus | Tail |
|-----|---------|-------------------------|----------|-------------|
| ♂ ♀ | 274-290 | c. 36-39 | c. 45-48 | 149-161 mm. |

COLOURS OF BARE PARTS. Iris dark brown. Bill dull fleshy or dusky greenish. Legs and feet fleshy white (Baker).

10. Slenderbilled or Short-tailed Shearwater. *Procellaria tenuirostris* Temminck

Procellaria tenuirostris Temminck, 1835, Pl. Col., livr. 99: text to pl. 587

(Seas north of Japan and shores of Korea = Japan)

Baker, FBI No. 2197, Vol. 6: 304 [= *Puffinus tenuirostris tenuirostris* (Temminck)]

OTHER NAMES. Mutton-bird, Whale-bird.

SIZE. Pigeon; length c. 33 cm. (13 in.).

FIELD CHARACTERS. Pelagic.

Adult. *Above*, dark sooty brown, crown and primaries nearly black. *Below*, paler and greyer with grey chin and throat and greyish under wing-coverts.

STATUS, DISTRIBUTION and HABITAT. Once obtained near Ormara on the Makran Coast, Baluchistan, in May 1889 mistakenly reported (JBNHS 12: 767) as *P. chlororhynchos* (cf. above). Another example picked up dead on the south coast of Ceylon in May 1949 (Phillips 1951, SZ 26: 151). Both these doubtless blown in by SW. Monsoon gales. Breeds on islands in the neighbourhood of Tasmania and southeastern Australia. Ranges northward to Korea and Japan, and to Behring Straits and western coasts of North America.

MUSEUM DIAGNOSIS. For description of plumages, biology, etc. see Murphy 1936: 673-6.

MEASUREMENTS

| | Wing | Bill (from feathers) | Tarsus | Tail |
|-----|---------|-------------------------|--------|----------------------|
| ♂ ♀ | 258-280 | 31-34 | 49-52 | 80-85 mm. (Baker) |

COLOURS OF BARE PARTS. Iris brown. Bill blackish brown, tinged with olive. Legs and feet purplish black, with outer toes and outer side of tarsus black.

11. Mauritius Shearwater. *Procellaria herminieri bailloni* Bonaparte

Procellaria nugax a. bailloni Bonaparte, 1857, Conspl. Av., 2: 205

(ex *Insula Franciae* = Mauritius)

Not in Baker, FBI

LOCAL NAME. *Hoogula* (Maldives).

SIZE. Pigeon — ; length c. 30 cm. (12 in.).

FIELD CHARACTERS. Pelagic.

Adult. *Above*, sooty black with greyish neck, the grey extending to sides of breast. *Below*, white; under tail-coverts black or black-and-white. Sexes alike.

STATUS, DISTRIBUTION and HABITAT. Breeds in the Maldives Islands. Extralimital also in Mauritius, Réunion, Rodriguez, Seychelles, etc. Ranges in the tropical Indian Ocean, but strangely enough not yet obtained in coastal Ceylon or western India.

MIGRATION. ?

GENERAL HABITS. Like other petrels, spends most of the non-breeding season at sea. Glides swiftly close to the surface skimming over the waves

in a wandering course on extended motionless wings interrupted by a few rapid strokes, often lowering legs and paddling or 'walking' along the water. Turns and twists from side to side in flight flashing the white breast intermittently, like sand plovers in a flock. Ranges widely over vast expanses of ocean, returning at the appointed season to its specific breeding islands.

FOOD. Small fish, squids, and other surface-floating animals; refuse thrown overboard, etc.

VOICE and CALLS. Unrecorded in India.

BREEDING. Gregarious. *Season*, in Maldives apparently between October and January, or later; said by the islanders to continue throughout the year. Burrows were found to contain eggs and young on 29 December (Gadow in Gardiner 1903); also between 26 and 31 January (1958, Phillips & Sims, JBNHS 55: 201). *Nest*, a burrow excavated in sand beneath roots of scrub, within six metres of the shore; particularly numerous on small uninhabited islets. The birds visited the burrows only at night, between midnight and 4 a.m. *Eggs*, white; one measured 49 x 35 mm. Clutch size? Incubation period? (Both the incubation and nestling periods are inordinately protracted in shearwaters and petrels.) Presumably, as in other petrels, both sexes incubate.

MUSEUM DIAGNOSIS. For description of plumages etc. of nominate race *therminieri* see Murphy 1936: 684-7. *Bailloni* differs from it only in details. It differs from the more northerly occurring race *persica* (see below) in being somewhat smaller with a shorter bill, and in the greyish of the neck extending to sides of breast. (See also Palmer 1962, 1: 198.)

MEASUREMENTS. Specimens from Maldives, Seychelles, Réunion measure: 7 ♂ ♀ Wing 181-198 (av. 191.7); bill (nostril to tip) 21-23 (av. 21.6) mm. Specimens collected at Aden, and on the Makran and western India coasts (*P. l. persica*) measure: 4 ♂ ♀ Wing 199-210 (av. 204.5); 5 ♂ ♀ bill (nostril to tip) 25-27 (av. 25.6) mm.

COLOURS OF BARE PARTS. Iris dark brown. Bill slate, ridge of culmen and tip black. Legs and feet slate-blue (livid flesh in juv.), back of tarsus and outer toe black, middle of webs and joints dusky (Witherby).

12. Persian Shearwater. *Procellaria therminieri persica* (Hume)

Puffinus persicus Hume, 1873, Stray Feathers, 1: 5

(at sea between Gwadar and Muscat)

Baker, FBI No. 2200, Vol. 6: 306

SIZE. Pigeon - ; length c. 31 cm. (12 in.).

FIELD CHARACTERS. Similar to *P. l. bailloni* but somewhat larger and with a longer bill. Less grey on neck and with a narrow white ring round eye and a white streak behind it. Difficult to distinguish unless in the hand. (See measurements under *P. l. bailloni*.)

STATUS, DISTRIBUTION and HABITAT. Arabian Sea coasts between Aden and Karachi. Common and abundant in the Persian Gulf and the Gulf of Oman, and on the Makran Coast. Breeding stations unknown; may lie off the Makran Coast or the Straits of Hormuz as suggested by Meinertzhagen (1954: 441).

Two specimens (Wing 201 and 212 mm.) have been taken on the Bombay Coast in the SW. monsoon season, doubtless storm-blown, and one in Kerala (JBNHS 16:14). The racial identity of the last is undetermined.

MUSEUM DIAGNOSIS

MEASUREMENTS

| | Wing | Bill (from feathers) | Tarsus | Tail |
|-----|---------|-------------------------|--------|-----------------------|
| ♂ ♀ | 185-209 | c. 38 | 31-33 | 87-103 mm. (Baker) |

COLOURS OF BARE PARTS. Iris brown. Bill dusky brown, bluish at the base and most of lower mandible. Legs and feet pinkish white; outer part of tarsus and outer toe including web black, variable in extent.

Genus *BULWERIA* Bonaparte

Bulweria Bonaparte, 1843 (1842), Nouv. Ann. Sci. Nat. Bologna 8:426.

Type, by monotypy, *Procellaria bulwerii* Jardine & Selby

Very closely allied to *Procellaria* but considerably smaller and of a more or less uniformly slate colour. Feet weaker; tail comparatively longer. Nostrils on top of culmen forming two quite separate round holes, this portion somewhat soft.

13. Mascarene Black Petrel. *Bulweria aterrima* (Bonaparte)

Procellaria aterrima 'Verr.' = Bonaparte, 1857, Conspl. Av., 2:191

(ex Insula Bourbonica, Afr. occ. = Réunion)

Not in Baker, FBI

OTHER NAMES. Réunion Petrel, Mascarene Gadfly Petrel.

SIZE. Pigeon +; length c. 36 cm. (c. 14 in.).

FIELD CHARACTERS. Pelagic.

Adult. *Above and below dark grey-brown or sooty black, with wedge-shaped tail. Bill short, stout, black. 'Feet dark reddish flesh colour; outer toe and webs black'* (Alexander 1955). Dimorphic: dark and light colour phases. Has been likened to a huge swift flying low and fast over the surface of the sea.

STATUS, DISTRIBUTION and HABITAT. Indian Ocean from the Mascarene Islands north to the Gulf of Aden. Doubtfully breeding on Réunion Island c. 21°0'S., 55°30'E.

A live specimen (storm-blown?) taken by fishermen at Bombay, 15 June 1940, identified at Colombo Museum (JBNHS 42:193). Unfortunately the skin cannot be traced for rechecking; therefore the record must stand unconfirmed till fresh specimens come to hand.

13a. Jouanin's Gadfly Petrel. *Bulweria fallax* Jouanin

Bulweria fallax Jouanin, 1955, L'Oiseau 27:160

(at sea, approximately 12°30'N., 55°E.)

Not in Baker, FBI

OTHER NAME. Jouanin's Black Petrel.

PROCELLARIIFORMES

SIZE. Pigeon -- ; length c. 29-30 cm. (12 in.).

FIELD CHARACTERS. Pelagic.

Adult. *Above* and *below* brownish black with long wedge-shaped tail and a short, thick bill. Sexes alike.

STATUS, DISTRIBUTION and HABITAT. Probably breeds in burrows on islands such as Kuria Muria off eastern Aden, Socotra, or Abd-el-Kuri. Found commonly in the Arabian Sea and the Gulf of Aden throughout the year. Bailey and Bourne (1963, JBNHS 60: 258) report that they handled several examples of this species that came aboard an aircraft carrier at 16°49'N., 55°15'E. and 18°50'N., 57°50'E. on 14 February 1960, and 11°24'N., 57°05'E. on 25 May in the central Arabian Sea off the mouth of the Gulf of Aden.

GENERAL HABITS. Unknown, but has been observed feeding alone far from land.

FOOD. One of the birds handled by Bailey (Bailey & Bourne, loc. cit.) vomited a small squid.

BREEDING. Unknown, but probably some time between October and March.

MUSEUM DIAGNOSIS

MEASUREMENTS

| Wing | Bill | Tarsus | Tail | Wingspan |
|------|------|--------|------|----------|
| 240 | 29 | 32 | 125 | 790 mm. |

COLOURS OF BARE PARTS. Bill black. Feet flesh-coloured with black outer edges to the legs and toes.

13b. Bulwer's Gadfly Petrel. *Bulweria bulwerii* (Jardine & Selby)

Procellaria bulwerii Jardine & Selby, 1828, Ill. Orn., 2. pl. 65 (Madeira)
Not in Baker, FBI

OTHER NAMES. Bulwer's Petrel, Bulwer's Black Petrel.

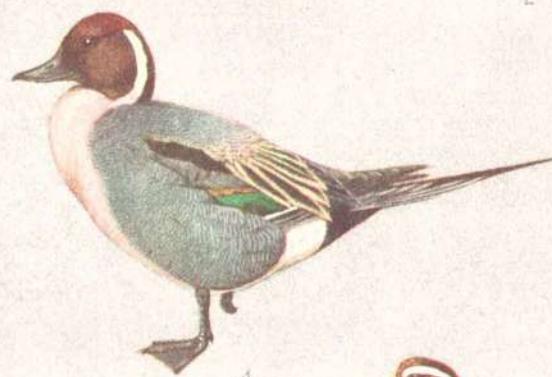
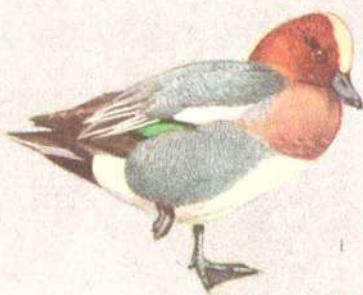
SIZE. Pigeon -- ; length c. 26·5-28 cm. (10½-11 in.).

FIELD CHARACTERS. A small brownish black gadfly petrel, rather paler on chin and edges of greater wing-coverts, with a short, slim bill, short legs, and a long, wedge-shaped tail.

PLATE I

1 *Anas penelope*, Wigeon (103). 2 *Anas s. strepera*, Gadwall (101). 3 *Anas c. crecca*, Common Teal (94). 4 *Anas acuta*, Pintail (93). 5 *Anas querquedula*, Garganey (104). 6 *Anas cygnoides*, Shoveller (105). 7 *Aythya fuligula*, Tufted Duck (111). 8 *Aythya nyroca*, White-eyed Pochard (109). 9 *Podiceps c. cristatus*, Great Crested Grebe (3). 10 *Podiceps r. capensis*, Little Grebe (5).

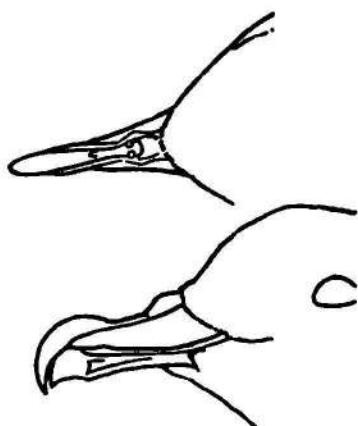
Ducks all ♂♂ in summer (breeding) plumage



ONE FOOT

300 mm.

A. J. Johnson
1926

Bill of *Bulweria bulwerii*, × c. 1

MUSEUM DIAGNOSIS

MEASUREMENTS

| Wing | Bill | Tarsus | Tail |
|------|------|--------|---------|
| 200 | 21 | 27 | 110 mm. |

COLOURS OF BARE PARTS. Bill black. Legs mainly pink; feet flesh-colour, outer toes and webs black.

Family HYDROBATIDAE: Storm Petrels

The smallest sea birds, closely related to Shearwaters, up to about Myna size (c. 25 cm. or 10 in.), of blackish or greyish plumage, mostly with a white rump. Wings long; tail medium to long; neck short. Bill slender, of medium length, grooved, hooked at tip. Nostrils tubular with a single orifice. Legs slender, medium to long; feet webbed, mostly black. Webs black or particoloured. Sexes alike.

Genus OCEANITES Keyserling & Blasius

Oceanites Keyserling and Blasius, 1840, Wirbelth. Eur. 1: xciii, 131, 238. Type, by subsequent designation, *Procellaria wilsonii* Bonaparte = *Procellaria oceanica* Kuhl

Size small. Bill slight, and shorter than head; the orifice of the combined nostrils single. Wings very long and narrow: 2nd primary (as.) longest. Tail moderate, slightly forked. Tibia partly naked; tarsi smooth, much longer than toes. Hind toe only represented by a minute claw. Basal phalanx of middle toe not flattened; shorter than the other phalanges plus claw. Claws sharp, spatulate, but little flattened.

The genus ranges through the southern oceans and into the North Temperate zone.

14. Wilson's Storm Petrel. *Oceanites oceanicus oceanicus* (Kuhl)

Procellaria oceanica Kuhl, 1820, Beitr. Zool. Abth., 1: 136 pl. 10, f.1.

(No type locality. South Georgia designated by Murphy,

1918, Bull. Am. Mus. Nat. Hist., 38: 128)

Baker, FBI No. 2194, Vol. 6: 300

OTHER NAMES. Mother Carey's Chicken, Yellow-webbed Storm Petrel.

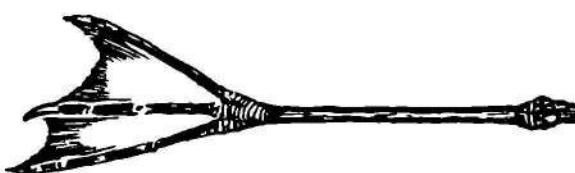
SIZE. Bulbul; length c. 19 cm. (7½ in.).

STATUS, DISTRIBUTION and HABITAT. Pelagic. Breeds on islands off the coast of China; the Bonin Islands, Vulcan Islands, the western Hawaiians and Marquesas Islands in the Pacific Ocean. Also breeds on Madeira, the Salvages, Canary and Cape Verde Islands in the Atlantic. Phillips (1959, Bull. BOC, 79: 100–101) has reported upon the occurrence of this species in the Indian Ocean, having secured a specimen in the Maldives in August, 1958.

FOOD. Probably squid, small fish, and zooplankton.

BREEDING. Eggs are known from May to July.

FIELD CHARACTERS. Pelagic. A small sooty black storm petrel with a conspicuous white patch above tail (coverts) and a pale wing-bar. Longish slender black legs with distinctive lemon-yellow webbed toes which characteristically project behind the short square tail in flight. Sexes alike.



Foot, $\times 1$

Dark coloration and white rump, as well as flight, superficially reminiscent of house swift. The only storm petrel with white rump and dark underparts occurring regularly in the Indian Ocean.



$\times c. \frac{1}{2}$

STATUS, DISTRIBUTION and HABITAT. Claimed to be one of the most numerous bird species in the world, and is certainly the most wide-ranging of the storm petrels. Breeds on Antarctic and subantarctic islands wandering north in the Atlantic, Pacific and Indian oceans in summer, to Europe, Arabia, India, New Guinea, Japan, California, etc. Not uncommon along

the coasts of the Persian Gulf, Makran and Sind. Also visits coastal Ceylon chiefly during the SW. Monsoon, and has been taken at Kanyakumari (Kerala). Sinclair (1888, JBNHS) mentions it as 'known but rare' on the Konkan coast (W. India). A specimen¹ was collected within two miles of Bombay docks on 22.10.1947 when also a number of scattered birds were observed

in coastal waters a few miles southward (Abdulali, JBNHS 47: 550). This is possibly a regular seasonal occurrence but curiously enough unrecorded. H. G. Alexander noted it about 150 miles out of Bombay towards Aden on 10 September (*Ibis*, 1929: 43). Not recorded from northern parts of the Bay of Bengal, but several from the neighbourhood of Malaya.

MIGRATION. The meagre authentic records for the Indian Ocean suggest that probably the main body of birds from the Antarctic breeding grounds reaches north to Socotra and the Arabian coast in May–June, returning by way of the waters off Ceylon between September and November (Gibson-Hill 1948, JBNHS 47: 445).

GENERAL HABITS. Keeps in scattered ones and twos or small parties — sometimes large gatherings of 200 or more. Often met far out at sea flying swift-like (alternate glides and fluttering) close over the water even in a choppy sea, or riding buoyantly on the wave crests. Picks up floating animalcules from the comparatively calm troughs between the waves, getting hidden now and again behind the swell. Feeds by 'walking' or 'hopping' on the water with wings fluttering and held slightly above line of back — strangely reminiscent of a flock of jungle babblers hopping in active search of food — long legs dangling, feet paddling, head bent low and bill touching the surface.

FOOD. Mainly zooplankton.

BREEDING. In the south polar and subpolar zones in the southern summer, November to January. Nests in crevices in cliffs, under and amongst stones of screes, etc.

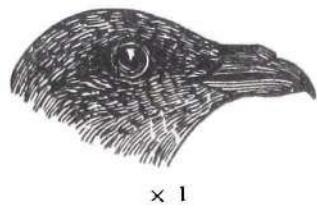
MUSEUM DIAGNOSIS. For details of plumage etc. see Murphy 1936, 2: 749; Baker 1929, 6: 300.

MEASUREMENTS

| | Wing | Bill (from feathers) | Tarsus | Tail |
|-----|---------|-------------------------|--------|----------------------|
| ♂ ♀ | 140–157 | 12–14 | 32–36 | 72–84 mm. (Baker) |

COLOURS OF BARE PARTS. Iris blackish. Bill dull black. Legs and feet black, with a conspicuous pale yellow patch in the centre of each web.

¹Dr C. A. Gibson-Hill who examined this specimen suggested that it might be of the Kerguelan breeding race *parvus*. But the differences between the races are so slight and the overlap in the measurements so considerable that he could not be definite. The bird measured: Wing 145; bill 18·5; tarsus 35; tail 59 mm.



PROCELLARIIFORMES

Genus FREGETTA Bonaparte

Fregetta Bonaparte, 1855, Comp. Rend. Acad. Sci. Paris 41: 1113. Type, by original designation, *Thalassidroma leucogaster* Gould

Very close to *Oceanites*. Differs from it in having the first phalanx of the middle toe greatly flattened and longer than the other phalanges plus claw. Claws flattened, broad, spade-shaped and pointed at end.

The genus is chiefly found in the southern oceans.

15. Duskyvented Storm Petrel. *Fregetta tropica melanogaster* (Gould)

Thalassidroma melanogaster Gould, 1844, Ann. & Mag. Nat. Hist., 13: 367

(Southern Indian Ocean)

Baker, FBI No. 2195, Vol. 6: 302

OTHER NAMES. Gould's Storm Petrel; Mother Carey's Chicken.

SIZE. Bulbul ±; length c. 20 cm. (8 in.).

FIELD CHARACTERS. Pelagic. Like Wilson's Storm Petrel sooty black above with white rump, but with underside including middle of under wings white. A black band along middle of belly through under tail-coverts. Legs shorter, all black, including webs of toes. 'The longitudinal dark band on the belly, with conspicuous white areas on either side, distinguish this storm petrel from its congeners. It is, however, surprisingly difficult to differentiate in life as it follows a ship or dances upon the ocean' (Murphy 1936, 2: 764). Flight weaker, more fluttering and bat-like; otherwise habits more or less the same as last.

STATUS, DISTRIBUTION and HABITAT. Accidental straggler. Breeds in colonies on islands in the Antarctic and subantarctic zone, e.g. Kerguelen and South Orkney. Only a single old record from our area — a specimen collected in the Bay of Bengal (c. 1895) by or for the Marquis of Tweeddale, now in the British Museum. The bird ranges in the seas south of Australia, but has apparently not been seen elsewhere in the Indian Ocean.

Jerdon 1864 (3: 827), mentioned that a storm petrel was not of unfrequent occurrence near the mouths of the Ganges in stormy weather, as well as in the Bay of Bengal. The species was not established, and no recent authentic identification is available.

MUSEUM DIAGNOSIS. For description of plumages, also biology, see Murphy 1936, 2: 764-7.

MEASUREMENTS

| | Wing | Bill (from feathers) | Tarsus | Tail |
|-----|---------|-------------------------|----------|----------------------|
| ♂ 9 | 158-176 | 14-15 | c. 40-43 | 73-81 mm. (Baker) |

COLOURS OF BARE PARTS. Iris brown. Bill, legs and toes (including webs) black.

Genus OCEANODROMA Reichenbach

Oceanodroma Reichenbach, 1853 (1852), Av. Syst. Nat.: iv. Type, by original designation, *Procellaria furcata* Gmelin

Cf. Austin, O. L., Jr., 1952, Bull. Mus. Comp. Zool., Harvard, 107: 399-401

Rather close to *Fregetta* and *Oceanites* but with deeply forked tail of 12 feathers. Tarsus about equal to middle toe plus claw. 1st primary (as.) concealed, minute and pointed; 3rd primary longest.

16. Forktailed Storm Petrel. *Oceanodroma leucorhoa monorhis* (Swinhoe)

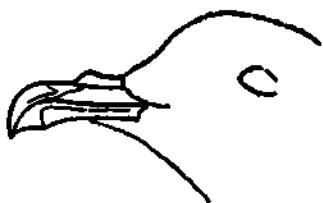
Thalassidroma monorhis Swinhoe, 1867, Ibis: 386 (Amoy, China)

Not in Baker, FBI

OTHER NAME. Leach's Storm Petrel.

SIZE. Bulbul ±; length c. 17-19 cm. (c. 7-7½ in.).

FIELD CHARACTERS. Pelagic. Similar in size to Wilson's but appearing a fairly uniform sooty brown, including underwing. Slightly greyer on neck and underparts, and with dark rump instead of white. Differs also in its distinctly forked tail, and shorter black legs and black feet. Flight similarly swallow-like but stronger than in whiterumped species described. Sexes alike.



Bill of *Oceanodroma leucorhoa*, × c. 1

STATUS, DISTRIBUTION AND HABITAT. Rare vagrant. Breeds on islets from Korea and coastal Japan south to Quelpart Island, and islets off Formosa. Winters south to Singapore. In our area only a single specimen obtained in Ceylon — an exhausted storm-driven male at Mutwal near Colombo, 3 July 1927. This was apparently misidentified by Stuart Baker as of the Californian race *socorroensis*. Also a fairly reliable identification (H. H. Tomlinson) of one that came on board ship a little west of Colombo, 10 June 1923, and was examined in the hand (Gibson-Hill 1948, JBNHS 47: 447-8).

MUSEUM DIAGNOSIS. For description of plumage, measurements and other details, see Austin, 1952.

COLOURS OF BARE PARTS. Iris brownish. Bill, legs, and feet black (Palmer 1962, 1: 226).

Order PELECANIFORMES

Family PHAETHONTIDAE: Tropic-Birds

Wide-ranging tropical sea birds similar in size and superficial appearance to terns but morphologically closer to cormorants and frigate birds. Plumage in adults chiefly white and black. Head large; neck short; bill yellow or orange-red, longish, stout, slightly decurved, pointed. Wings long and pointed. Tail wedge-shaped with the middle pair of feathers in adults narrow, ribbonlike, much elongated as in the Paradise Flycatcher (*Terpsiphone*). Legs extremely short; feet webbed (connecting all 4 toes). Sexes alike. Young hatch from the egg with down. Eggs curiously like those of the raptors especially the Scavenger Vulture (*Neophron*). (For details of anatomy etc. see Baker 1929, 6: 290.)

Genus PHAETHON Linnaeus

Phaethon Linnaeus, 1758, Syst. Nat., ed. 10, 1: 134. Type, by subsequent designation,*Phaethon aethereus* Linnaeus

Cf. Gibson-Hill, C. A., 1950, JBNHS 49: 67-80

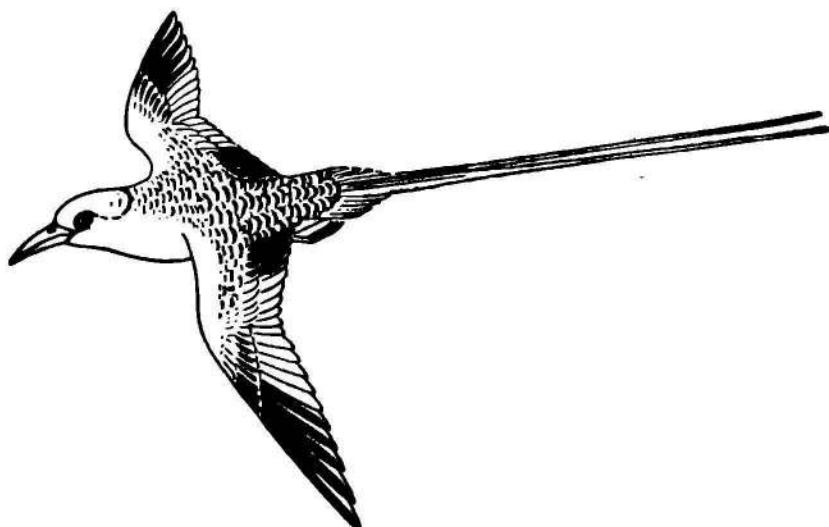
Characters as of the Family. The genus is represented throughout the tropical seas of the world.

Key to the Species

| | | Page |
|---|---|------------------------------------|
| A | With elongated tail streamers..... | 1 |
| B | Without elongated tail streamers..... | 2 |
| 1 | Streamers red..... | <i>P. rubricauda</i> (adult) 24 |
| | Streamers white..... | a |
| a | Upper and lower parts white, black wing-bar, bill yellow to orange..... | <i>P. lepturus</i> (adult) 24 |
| | Upperparts barred with black, black wing-bar, bill red | <i>P. aethereus</i> (adult) 22 |
| 2 | Upperparts barred with black, bill black..... | <i>P. rubricauda</i> (juvenile) 24 |
| | Upperparts barred with black, bill yellow..... | b |
| b | With black nuchal crescent..... | <i>P. aethereus</i> (juvenile) 22 |
| | Without black nuchal crescent..... | <i>P. lepturus</i> (juvenile) 24 |

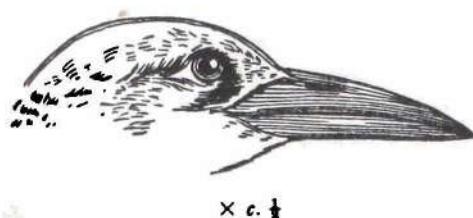
17. Short-tailed Tropic-bird. *Phaethon aethereus indicus* Hume*Phaethon indicus* Hume, 1876, Stray Feathers, 4: 481, 483 (Makran Coast)
Baker, FBI No. 2188, Vol. 6: 291

OTHER NAMES. Boatswain or Bos'n bird; Redbilled Tropic-bird.

SIZE. Blackheaded Gull or large tern; length c. 40 cm. (16 in.) + tail
ribbons c. 30 cm. (12 in.).

x c. 1/2

FIELD CHARACTERS. Pelagic. A predominantly white tern-like sea bird with two greatly elongated ribbons in the wedge-shaped tail as in the Paradise Flycatcher's.



horizontal patch on posterior flanks. Bright coral red bill diagnostic. Sexes alike.

Young (immature). Black-spotted crown and nape, heavier black barring on back, and no ribbons in tail.

STATUS, DISTRIBUTION and HABITAT. Northern parts of Indian Ocean. Breeds on islands off the Somali coast, and in the Straits of Bab-el-Mandeb and the Persian Gulf. Ranges widely over the ocean in the off season. Recorded at sea off the Makran coast (February), between Karachi and Gulf of Kutch (March), Bombay (February, May and July — Navarro, Rauf Ali, JBNHS 59: 649; 63: 437); also from the Laccadive Islands. A specimen secured on 3 February 1956 west of southern Ceylon ($7^{\circ}52' N.$, $77^{\circ}26' E.$) is apparently the first authentic record in Ceylon waters, and also the southernmost in our area (Phillips 1958, SZ 28: 184). Recorded again in July 1972 (A. E. Butler, CBCN).

GENERAL HABITS. Flight tern-like but stronger and more direct with steady powerful flapping of the long, pointed wings, each flap perceptibly raising and lowering the bird in the air. Resembling the flight of a pigeon and punctuated with bouts of gliding. Usually unafraid, flying inquisitively quite close around ships far out at sea. The birds hover over a promising spot as if to take aim, and plunge headlong from a height of 30 or 40 metres on their prey, like the sea terns and boobies.

FOOD. Mainly fish and squids. Flying fish have often been taken from crops of specimens.

VOICE and CALLS. Loud, monosyllabic, rather finch-like (Phillips); 'incessant screams while circling around ship' (E. H. Aitken).

BREEDING. *Season.* March/April recorded in the Persian Gulf. A single egg laid under shelter of a ledge of rock or in a crevice. Often nests gregariously. Incubation period c. 28 days.

For breeding biology of the species see Stonehouse 1962: 124–61.

MUSEUM DIAGNOSIS. For details of plumage etc. see Baker, loc. cit.

MEASUREMENTS

| | Wing | Bill (from feathers) | Tarsus | Tail (including streamers) |
|-----|---------|-------------------------|--------|-------------------------------|
| ♂ ♀ | 281–301 | 55–60 | 25–28 | 215–301 mm. |

COLOURS OF BARE PARTS. Iris dark brown. Bill orange-red to dusky red, the tip, edge of commissure and nareal groove blackish. Legs and feet yellow or yellowish white, the anterior toes and webs between them black (Baker).

18. Redtailed Tropic-bird. *Phaethon rubricauda rubricauda* Boddaert*Phaethon rubricauda* Boddaert, 1783, Table Pl. enlum.: 57 (Mauritius)

Baker, FBI No. 2189, Vol. 6: 292

Plate 5, fig. 1, facing p. 96

SIZE. Blackheaded Gull ± or large tern; length c. 36 cm. (14 in.) + tail with streamers c. 48 cm. (19 in.).

FIELD CHARACTERS. Pelagic. A tern-like sea bird, predominantly silky white, with black streak through eye, black shafts to wing and tail feathers, and two long, somewhat stiff narrow bright red streamers in wedge-shaped tail which project spike-like rather than trail ribbon-like in flight. Sexes alike.

STATUS, DISTRIBUTION and HABITAT. Breeds on Mauritius, Assumption, and the Aldabra group of islands. Ranges widely in the tropical western Indian Ocean. Vagrants reported from the Bay of Bengal several times, but not collected and determined racially. May belong to the Christmas Island and Cocos-Keeling breeding population *westralis* Mathews.

GENERAL HABITS. Like other tropic-birds, usually met far out at sea, singly or in pairs — not gregariously. Does not follow ships for scraps, but often circles round close above them inquisitively and unafraid, and then moves on. Flight more buoyant than of the Short-tailed species. For feeding ecology see Ashmole & Ashmole, 1967, Peabody Mus. Bull. 24: 19.

MUSEUM DIAGNOSIS. For details of plumages etc. see Baker, loc. cit.; Mathews and Iredale 1921: 80.

MEASUREMENTS

| | Wing | Bill (from feathers) | Tarsus | Tail (including streamers) |
|-----|---------|-------------------------|--------|-------------------------------|
| ♂ ♀ | 330-339 | 66-69 | 30-33 | 360-428 mm. (Baker) |

COLOURS OF BARE PARTS. ' Iris dark brown; eyelids black. Bill bright orange-red, paler or slightly brownish at the base, with a small black bar on the plane of the nostril. Legs and proximal one-third of the toes pale mauve or bluish white, with the distal two-thirds of the web black' (Gibson-Hill 1950).

19. White Tropic-bird. *Phaethon lepturus lepturus* Daudin*Phaethon lepturus* Daudin, 1802, Buffon Hist. Nat., ed. Didot., Quadr., 14: 319
(Mauritius)

Baker, FBI No. 2190, Vol. 6: 293

OTHER NAME. Yellowbilled Tropic-bird.

SIZE. Blackheaded Gull ± or large tern; length c. 38 cm. (c. 15 in.) + tail with streamers c. 45 cm. (18 in.).

FIELD CHARACTERS. Pelagic. A white tern-like sea bird with orange-yellow bill and upright crescentic black spot in front of eye continued behind as a black streak through it to nape. In flight, a broad black band from shoulder to shoulder across upper surface of wings conspicuous, interrupted in the middle by the white back. Black wing tips. Two very long white streamers (central tail-feathers) broader and more pliant (ribbon-like) than in the red-tailed species. At close range adult distinguishable from adult *indicus* by unbarred back. Sexes alike.

STATUS, DISTRIBUTION and HABITAT. The typical race breeds in the Mascarene, Seychelles, Maldive, Andaman, and Cocos-Keeling islands. Sight records for seas off Ceylon; 4 specimens taken on the island's west coast in Colombo Museum (Phillips 1953, Checklist: 3). Ranges over the tropical Atlantic, Pacific, and Indian oceans in several races.

GENERAL HABITS. Like other tropic-birds usually met with singly on the high seas. Has the same pigeon-like flight. Only seldom settles on water. For an excellent account of its biology see Murphy 1936: 802-7.

BREEDING. Season, in the Red Sea and Persian Gulf islands (?) May, June, and July (Baker); in the Maldive Islands apparently the cool months November to January (adult, nestling, and eggs collected on Mahosmadulu Atoll in November, and full-fledged juveniles on Tuladu Island in January — Phillips & Sims 1958, JBNHS 55 (2): 202).

For breeding biology see Stonchouse 1962: 124-61.

MUSEUM DIAGNOSIS. For description of plumages etc. see Murphy 1936: 802-3.

MEASUREMENTS

| | Wing | Bill (from feathers) | Tarsus | Tail |
|-----|---------|-------------------------|--------|---|
| ♂ ♀ | 252-282 | 44-51 | 21-23 | Central feathers up to 575, generally c. 450 mm. (Baker) |

COLOURS OF BARE PARTS. '♂ ♀ Iris dark brown; eyelids black. Bill yellowish grey, almost grey at the base with a dark grey line through the nostril. Legs and feet jet black, except for the inner toe and a small patch in the inner web which are a very light blue-grey, almost white' (Gibson-Hill 1950).

Family PELECANIDAE : Pelicans

LOCAL NAMES (for all species): *Häwāsil* (Hindi); *Bellua, Birwa or Bherwa* (Bihar); *Ganggoya, Gaganber, Garapolo or Gorapullo* (Bengal); *Chinkabatu* (Telugu); *Deohās, Dhera, Bhela* (Assam); *Uphong* (Manipur); *Pas boruwa, Pasbara* (Sinhala); *Kūlākēda* (Tamil, Ceylon); *Pen* (Sind; Kutch); *Kotumpannom* (Malayalam).

Large gregarious clumsy-looking birds with short stout legs and large fully webbed feet. Tarsus compressed, reticulate in front. Bill long, heavy, the upper mandible flattened and hooked at tip, the lower consisting of two narrow flexible arches, underhung throughout its length by a capacious singular pouch of loose naked skin. Nostrils obsolete, concealed in grooves running the whole length along either side of culmen. Wings large and broad, 2nd primary (as.) longest. Tail short, square, soft. The extensible pouch serves as a dip- or landing net for scooping up fish, and when nesting on the ground or in trees in the hot sun as a cooling device for dissipating moisture and promoting evaporation by constant pulsation. The skeleton of hollow bones is particularly light weighing less than a kilogram to the total body weight of about 12 kilograms. Thus in spite of some little effort in the initial take-off from the surface, particularly in a following wind, the birds can fly strongly and for long distances to and from their fishing grounds, and when migrating. They fly with the neck bent back in a flat S, head drawn in between the shoulders, the large broad wings beating the air powerfully and steadily with a whistling sound. The flat-kneed underside of the body is beautifully streamlined for buoyant flight and is reminiscent of the float of a flying boat. When alighting on the water the birds

PELECANIFORMES

make full use of their wings and tail to check momentum, at the same time throwing out their broadly webbed feet well forward to act as friction brakes against the water. Pelicans fly either in the characteristic V-shaped echelons of geese, or in long straggly ribbons with a wide front. The birds are much given to soaring on thermals, and flocks may commonly be seen in the middle of a hot day sailing on outspread motionless wings with upturned tips, in graceful circles high up in the blue, by themselves or in company with storks and vultures.

The birds frequent large freshwater lakes and jheels, and brackish lagoons. Their food consists almost exclusively of fish, some of considerable size being taken. A single bird is estimated to consume as much as 2 kg. per day. While the greater part of the fish perhaps consist of species of small economic worth, which are always in the majority, pelicans occasionally do some damage to commercial fisheries also. The method of fishing is by cooperative effort, a flotilla of birds swimming in a semicircle, or from bank to bank across an arm of a lake, vigorously splashing on the water with their large wings to drive a school of fish into the shallows. They do not dive for their prey like cormorants, but merely sail or rush into the shoal with bills open and lower mandible trailing in the water, or head completely submerged, the enormous skin bag acting as a landing net for the quarry which is swallowed by an upward jerk of the bill. Only the American Brown Pelican normally plunges from the air on fish like the sea terns or gannets. When sated the birds waddle on to the shore to rest and preen and digest, before resuming the hunt.

The oil obtained from pelicans' fat is highly valued in Indian medicine as an embrocation for rheumatism and similar ailments.

DISTRIBUTION. Temperate and tropical America, Africa, Asia, Europe, Australia. Some species migratory.

VOICE Syringeal muscles responsible for true voice-production, lacking. Adults usually silent; rarely uttering throaty grunts or croaks likened to the grunt of a buffalo. Young have a variety of groans, yelps and chattering.

Genus PELECANUS Linnaeus

Pelecanus Linnaeus, 1758, Syst. Nat., ed. 10, 1: 132. Type, by subsequent designation,
Pelecanus onocrotalus Linnaeus

Characters as of the Family.

Key to the Indian forms

| | Page |
|--|---|
| A White with black primaries, bill and pouch yellow to orange..... | 1 |
| B General coloration grey, no black in wings, bill flesh with blue spots, pouch dull purple..... | <i>P. p. philippensis</i> (adult) 29 |
| C Pale brown above, white below..... | <i>P. p. philippensis</i> (juvenile) 29 |
| D Brown to dingy white, irregularly speckled with brown..... | 2 |
| 1 Feathers of forehead end in a point..... | <i>P. onocrotalus</i> (adult) 27 |
| Feathers of forehead end in a transverse concave line..... | <i>P. p. crispus</i> (adult) 30 |
| 2 Feathers of forehead end in a point..... | <i>P. onocrotalus</i> (juvenile) 27 |
| Feathers of forehead end in a transverse concave line..... | <i>P. p. crispus</i> (juvenile) 30 |

20. White or Rosy Pelican. *Pelecanus onocrotalus* Linnaeus

Pelecanus onocrotalus Linnaeus, 1758, Syst. Nat., ed. 10, 1: 132. (Africa, Asia)
Baker, FBI No. 2176, Vol. 6: 270

Plate 6, fig. 1, facing p. 112

LOCAL NAMES. See under Family.

SIZE. Vulture \pm ; length c. 183 cm. (72 in.).

FIELD CHARACTERS.

'Adult. Plumage mostly white, tinged with rose colour, with a tuft of yellowish feathers on the breast; primaries and some of the secondaries black; slight crest on the back of the head; feathers of the forehead ending in a point above the bill. Sexes alike; female smaller.'

A



B



Feathers of forehead of (A) *P. onocrotalus* and (B) *P. philippensis* \times c. $1/16$

'Young (immature). Pale buffish brown above, somewhat mottled; primaries brown; underparts white with no rosy tinge' (Alexander 1955: 174).

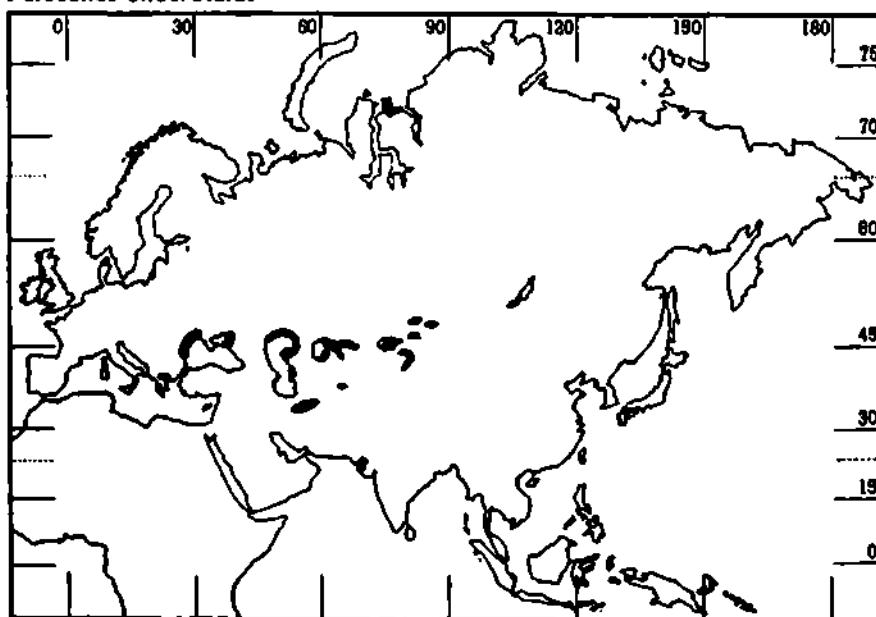
STATUS, DISTRIBUTION and HABITAT. Resident, at least in part; first discovered breeding in the Great Rann of Kutch in 1960 (Sálim Ali 1960, JBNHS 57: 414). Mainly winter visitor to W. Pakistan (Baluchistan, Sind) and N. India from the Punjab to Assam (U.P., Rajasthan, Kutch, Saurashtra N. Gujarat). Andhra (Visakhapatnam)?, and 'Madras' (?). Often vast congregations on large jheels and lagoons.

Extralimital. Breeding from Hungary to the lakes of central Asia, south to Iraq and the Persian Gulf (Bubiyan Island off Fao). Wintering in N. Africa, Asia and through Burma, Malaysia to E. China.

BREEDING. *Season.* February to April in the Great Rann of Kutch where several hundred pairs were first found in 1960 nesting among old worn-down flamingo nests on the periphery of the occupied 'City'. *Nest*, a skimpy to fairly substantial bed of large white feathers (the birds' own, and flamingos') close together, about one nest per square metre. On 21 March most nests contained two eggs or young each (some 3 or 4), from naked newly hatched chicks to hefty squabs in down, a fortnight or more old. *Eggs*, ivory white with a smooth gloss, not chalky-textured like flamingo eggs, about the same size but slightly broader. Average of 25 Kutch eggs

PELECANIFORMES

$95 \cdot 56 \times 61 \cdot 65$ mm.; of 14 from Persian Gulf, *fide* Baker, $88 \cdot 3 \times 57 \cdot 5$ mm. Chicks when newly hatched, naked glossy-skinned, dark flesh-coloured, changing to blackish in 3 or 4 (?) days. Turn blacker when feather papillae appear and the down and quills sprout. Bill, bill-pouch, and legs funereal black. Down of the larger squabs dull sooty black in striking contrast with the snowy white of the tree-nesting *P. philippensis* (q.v.). The larger squabs are enormously fat and ugly; when approached they herd together and waddle off with an ungainly, unsteady gait. On fright the Kutch chicks disgorged an astonishing quantity of fish (mainly *Cyprinodon dispar*) some fully 25 cm. long and weighing 500 to 600 gm. each.

Pelecanus onocrotalus

Breeding range

MUSEUM DIAGNOSIS. See Hartert 1912-22, 2: 1402.

MEASUREMENTS

| | Wing | Bill (from feathers) | Tarsus | Tail |
|----|---------|-------------------------|------------|-------------|
| ♂♂ | 700-730 | 430-450 | c. 130-140 | 190-210 mm. |
| ♀♀ | 640-680 | 390-400 | | |

COLOURS OF BARE PARTS. Iris red to crimson. Bill plumbeous blue, mottled with whitish along the centre, with the nail and edges of both mandibles red; lower mandible blue on the basal, yellow on the terminal half. Pouch, face and orbital skin yellow, brighter in the breeding season. Legs and feet fleshy pink; webs yellow (Baker).

[Details of a freshly killed specimen, Bharatpur, 2. 1. 1952.

Ad. ♂ Wing 745; bill (from skull) 435; tarsus 152; tail 163(?) mm.

Weight 11 kg. Iris yellow. Facial skin pale magenta-flesh (pink). Bill: a plumbeous-blue stripe along ridge of culmen, c. 2.5 cm. (1 in.) wide at forehead, narrowing

to c. 1·25 cm. ($\frac{1}{2}$ in.) near tip. Similar tapering lateral bands on either side of culmen and lower mandible for c. 25 cm. (10 in.) from gape; tip of bill (nail) pale cherry-red paling to a yellowish horn point. Pouch lemon-yellow. Legs and feet pale creamy grey. Pouch held c. 4 kg. of fish, some 25 cm. long.]

21. Spottedbilled or Grey Pelican. *Pelecanus philippensis philippensis* Gmelin

Pelecanus philippensis Gmelin, 1789, Syst. Nat. 1(2): 571 (Philippines = Manila, *vide* Stresemann 1952, Ibis 94: 514)

Pelecanus roseus Gmelin, 1789, Syst. Nat. 1(2): 570. (Manila, P.I.)
Baker, FBI No. 2179, Vol. 6: 274
Plate 2, fig. 1, facing p. 32

LOCAL NAMES. See under Family.

SIZE. Vulture +; slightly smaller than White Pelican. Length c. 152 cm. (60 in.).

FIELD CHARACTERS. Without black in wings.

Adult. Head, neck, and upperparts grey; underparts greyish white, the under tail-coverts mottled with brown; under wing-coverts and under tail-coverts tinged with vinaceous in summer; lower back, rump, and flanks tinged vinaceous in winter; a crest on the back of the head, composed of elongated brown feathers tipped with white; bill flesh-coloured with blue spots on the upper mandible; pouch dull purple with bluish black markings; feet dark brown. Sexes alike.

'The grey colouring which includes wings and tail, at once distinguishes this species' (Alexander 1955: 176).

Young (immature), pale brown above, white below.

STATUS, DISTRIBUTION and HABITAT. Resident and locally migratory, in well watered tracts in both Pakistans, all India, and Ceylon. Breeds in Ceylon, Madras (Tirunelveli and Chingleput districts), Andhra (West Godavari district), Assam (Kaziranga Wildlife Sanctuary) and doubtless elsewhere in suitable localities. Nicobar Is. (accidental. Abdulali, JBNHS 61: 500).

GENERAL HABITS, etc. See under Family.

BREEDING. Gregarious, often in traditional sites in mixed colonies with egrets, cormorants, etc. *Season*, in Ceylon December to March/April, at Aredu-Sarepalle, a few miles from Kolleru Lake in Andhra—the largest pelicanry known in India—chiefly October to March. *Nest*, a massive structure 60–75 cm. across, roughly circular, 30 cm. or more thick, on branches of *Pithecelobium*, mango, and other large trees, or on palmyra (*Borassus*) and coconut (*Cocos*) palms. On a thick foundation of twigs are bedded large quantities of rice straw from nearby newly harvested fields making the finished nest appear as though entirely made of that material. Sodden decaying water weeds and reed stems also used along with or instead of straw. Nests on palms built at base of the more or less horizontal stems of lowest leaves, the nests touching one another in a continuous untidy ring platform. Pilfering of material from neighbouring nests common. Nests constantly added to most of the time. *Eggs*, 3 or 4, chalky white becoming

stained and dirty in course of incubation; long to moderate ovals, nearly equal at both ends. Average size of 50 eggs 78.8×53.4 mm. (Baker). Both sexes incubate and also feed the young. In contrast with the White Pelican, the chicks when a few days old are covered with *snow-white* down. A great deal of noise prevails in a colony with groaning and yelping by the hungry chicks and throaty grunts and bill-clapping by the adults. Chicks feed by thrusting complete head into capacious bill-pouch of parent, flapping their wings ecstatically. Incubation period c. 30 days (Lamba 1963, *Pavo* 1: 110-19). Period from laying of egg to flying of young about five months. (For an excellent account of the Aredu-Sarepalle pelicanry in Andhra see K. K. Neelakantan 1949, JBNHS 48 (4): 656-66, and for photos E. P. Gee 1960, *ibid.* 57: 245-51.)

MUSEUM DIAGNOSIS. See Baker, loc. cit.; Robinson and Chasen 1936: 239.

MEASUREMENTS

| | Wing | Bill (from feathers) | Tarsus | Tail |
|----|---------|-------------------------|--------|-------------|
| ♂♂ | 530-607 | 324-355 | 86-98 | 168-196 mm. |
| ♀♀ | 525-550 | 285-308 | 75-86 | |

COLOURS OF BARE PARTS. Iris white to pale yellow, clouded with brown. Bill pinkish flesh or yellowish flesh with a row of bluish black spots on each side near the edge; the nail and terminal half of both mandibles orange, the lower mandible with bluish blotches near the centre. Pouch dull purple blotched with bluish black. Naked (facial) skin orange-yellow, livid in front of the eye. Legs and feet very dark brown or blackish (Baker).

Weight 1 o? imm. 5 kg (BNHS).

22. Dalmatian Pelican. *Pelecanus philippensis crispus* Bruch

Pelecanus crispus Bruch, 1832, Isis, Col. 1109 (Dalmatia)

Baker, FBI No. 2178, Vol. 6: 273

LOCAL NAMES. See under Family.

SIZE. Vulture +; same as White Pelican. Length c. 183 cm. (72 in.).

FIELD CHARACTERS.

Adult. Very similar to White Pelican, also mainly white with black primaries, and difficult to distinguish from it in the distance. Colour of legs and feet *dark grey* instead of pink; and forehead feathers ending in a *concave crescentic line* instead of a pointed wedge, best diagnostic clues. In flight dusky-white undersurface of wings distinguishes it from White Pelican. Sexes alike.

Young (immature) brownish grey above; white below. Pouch greyish.

STATUS, DISTRIBUTION and HABITAT. Breeds in SE. Europe, Asia Minor, Iran, N. China, SE. Mongolia. Winter visitor to N. Africa and our area: recorded in Baluchistan, Sind, Punjab, Kutch, Rajasthan (?), Saurashtra, N. Gujarat, Oudh, Bihar, Orissa (?), Bengal, Assam. Not in the Deccan, S. India or Ceylon. Flocks on large rivers, jheels, and coastal lagoons.

GENERAL HABITS, etc. See under Family.

MUSEUM DIAGNOSIS. For plumages see Naumann 1905, 11: 24.

MEASUREMENTS

| | Wing | Bill (from feathers) | Tarsus | Tail |
|-----|---------|-------------------------|---------|-------------|
| ♂ ♂ | 720-800 | 400-450 } | 116-122 | 220-230 mm. |
| ♀ ♀ | 680-720 | 360-380 } | | (Baker) |

COLOURS OF BARE PARTS. Iris white or yellowish white. Bill plumbeous grey, the nail and edges of both mandibles yellow over the apical half. Cheeks, orbital skin, and pouch, pale yellowish or creamy flesh-colour, the last deepening into orange-red in the breeding season. Legs and feet pale bluish grey or plumbeous.

MISCELLANEOUS. In Sind the Mohanas or inland fishermen use captive tethered pelicans as decoys. They also use the skin stretched over a frame as a helmet for stealthily approaching ducks and coots in water with bodies submerged, and capturing them by pulling them under by their legs one by one.

Family SULIDAE: Boobies

Sea birds of the size of large ducks, e.g. Brahminy, to larger than geese. Body stout, neck of moderate length, wings long and pointed, tail rather long and wedge-shaped. Bill stout, conical, pointed, and slightly downcurved at tip, but not hooked. Nostrils obsolete. Legs short and stout, feet large and fully webbed. Plumage typically white in adults with the primaries or entire wing black; also the tail in some species. Bill, and bare facial and gular skin, brightly coloured. Sexes alike or nearly so.

The majority of species live in the tropical seas. Boobies can be readily identified in the distance by their characteristic habit, shared with tropic-birds and sea terns, of plunging headlong into the water from a height of 8 to 17 metres in the air for fish. The large size and absence of streamers in the tail distinguishes them from both the others. That they are capable of very deep dives in pursuit of fish is shown by the fact that a booby was found entangled in a fishing net set 27 metres below the surface. They breed on oceanic islands, on the ground or in stick nests in trees.

For further details see Murphy 1936: 827-9; Witherby 1940, 4: 14; Palmer 1962, 1: 280.

Genus SULA Brisson

Sula Brisson, 1760, Orn. 1: 60; 6: 494. Type, by tautonymy, *Sula Brisson* = *Pelecanus pectoralis* Linnaeus

Characters as of the Family.

Key to the Indian forms

| | Page |
|---|--|
| A Plumage white above and below, primaries black..... | 1 |
| B Lower breast and belly lighter than rest of plumage..... | 2 |
| C Plumage uniformly dull brown above, paler below, with faint dark band across chest..... | <i>S. sula rubripes</i> (juvenile) |
| D Head, neck, wings, and foreparts dark; belly and tail white..... | |
| | <i>S. sula rubripes</i> (brown phase) 33 |
| 1 Trailing edge of wing broadly edged with black, tail black | |
| | <i>S. dactylatra melanops</i> (adult) 32 |

| | Page |
|--|------|
| Trailing edge of wing narrowly edged with black, tail white..... | |
| <i>S. sula rubripes</i> (adult) | 33 |
| 2 Lower breast, belly, and under tail-coverts pure white; head, neck, and rest of upperparts deep brownish black; under wing-coverts with broad white stripe..... <i>S. leucogaster plotus</i> (adult) | 34 |
| Lower breast, belly, and under tail-coverts whitish mixed with brown; head, neck, and rest of upperparts dull chocolate to fuscous; under wing-coverts with or without pale stripe..... <i>a</i> | |
| <i>a</i> Under wing-coverts with pale stripe..... | |
| <i>S. leucogaster plotus</i> (juvenile) | 34 |
| Under wing-coverts without pale stripe..... | |
| <i>S. dactylatra melanops</i> (juvenile) | 32 |

23. Masked Booby. *Sula dactylatra melanops* Heuglin

Sula melanops Heuglin, 1859, Isis, 351, pl. 10, f. 2 and 3

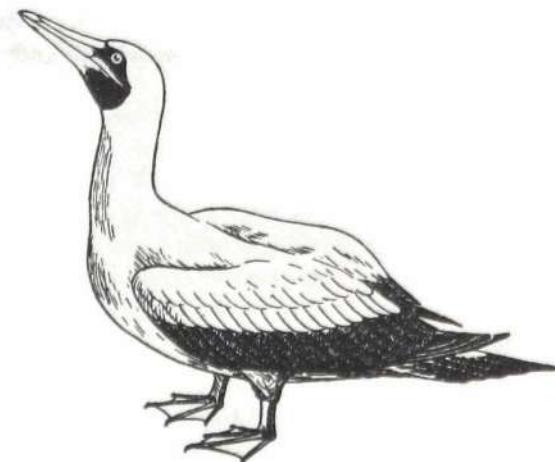
(Burda-Rebschi, Somali Coast)

Baker, FBI No. 2187, Vol. 6: 288 (*personata* ?)

OTHER NAMES. Bluefaced Booby; White Booby.

SIZE. Barheaded Goose +; length c. 80 cm. (32 in.).

FIELD CHARACTERS. The largest of the boobies.



× c. 1/10

Adult. Mainly white: wing quills, greater wing-coverts, and tail-feathers chocolate-brown; bill blue-grey, greenish yellow, yellow, or red; naked skin of face and throat (the mask) blue-black; feet yellow, orange, greenish blue, or slaty blue.

PLATE 2

- 1 *Pelecanus p. philippensis*, Spottedbilled Pelican (21), imm.
- 2 *Phalacrocorax niger*, Little Cormorant (28).
- 3 *Phalacrocorax c. sinensis*, Large Cormorant (26).
- 4 *Mycteria leucocephala*, Painted Stork (60).
- 5 *Threskiornis a. melanocephala*, White Ibis (69).
- 6 *Anhinga r. melanogaster*, Darter (29).
- 7 *Anastomus oscitans*, Openbill Stork (61).
- 8 *Ciconia e. episcopus*, Whitenecked Stork (62).
- 9 *Leptoptilos dubius*, Adjutant Stork (67).
- 10 *Ephippiorhynchus a. asiaticus*, Blacknecked Stork (66).



Am. Mus.
1932.

Young (immature). 'Head and neck dark brown; upperparts greyish brown' (Alexander 1955: 182).

STATUS, DISTRIBUTION and HABITAT. Common out at sea off the Sind and Makran coasts, at Ormara Head and elsewhere (Ticehurst, 1923, *Ibis*: 460). Occasionally blown in on the western seaboard during the monsoon gales. Obtained thus at Karachi, Bombay, Cannanore, and Ceylon (Kallutara and Putalam, on west coast). Once as far inland as Nasik, 112 km. NE. of Bombay (Sálim Ali 1958, JBNHS 55: 358). The Ceylon specimens have been recorded as of the Australasian race *personata*; but the races are not readily distinguished, especially in brown juvenile plumage, and geographically they are more likely to belong to this, the SW. Indian Ocean population. Sight record from the Maldives Islands (Phillips & Sims, 1958). Breeds on Socotra, Mait, and other islands off the Somali Coast, on Rodriguez and Farquhar islands near Mauritius, and on Seychelles, etc. Perhaps also in the Kuria Muria group off the Oman coast (Arabian Sea).

GENERAL HABITS. The plunging habit needs clear water in which prey can be spotted at some depth, therefore the birds usually avoid the muddy littoral. During the plunge the conspicuous dark tail is fanned out as a rudder. For breeding biology of the species see Dorward 1962: 174-200.

FOOD. Chiefly squids and flying fish.

MUSEUM DIAGNOSIS. See Murphy 1936: 846-7.

MEASUREMENTS. (*personata*)

| | Wing | Bill | Tarsus | Tail |
|-----|---------------------------------------|---------|----------|---------------------------|
| ♂ ♀ | 419-452, nearly always over 430 | 103-114 | c. 54-58 | c. 180-200 mm. (Baker) |
| | | | | |

COLOURS OF BARE PARTS. Iris yellow; for rest see Field Characters (above).

24. Redfooted Booby. *Sula sula rubripes* Gould

Sula rubripes Gould, 1838, Syn. Bds. Austr., app. pt. 4: 7
(New South Wales, Raine Island, northern Queensland)

Baker, FBI No. 2185, Vol. 6: 286

OTHER NAME. Redlegged Gannet.

SIZE. Large gull; length c. 41 cm. (26 in.).

FIELD CHARACTERS.

'Adult. Plumage mainly white, tinged with buff; primaries blackish brown; tail pale greyish brown; under wing-coverts mostly grey; bill light blue with brown tip and red base; naked skin of face blue, of throat black; feet red.'

'Young (immature). Plumage generally dull brown. In intermediate plumage, in which the bird often breeds, the head and underparts are lighter brown than the back and wings, whilst the rump, tail, and upper and under tail-coverts are white.' (Alexander 1955: 181-2.) Many other puzzling colour phases besides, not entirely explainable by age.

Adult distinguishable from adult Masked Booby by small size, whitish tail *contra* chocolate-brown, and red feet *contra* slaty.

STATUS, DISTRIBUTION and HABITAT. Breeds on many tropical islands in the Indian Ocean, e.g. Christmas Island, and in the western and central

Pacific. Ranges widely over the warm seas in these areas. Hume identified a flock on the Laccadive Islands (Baker 1929, 6: 287). A specimen (storm-blown?) taken in Ceylon in July (1936) in the neighbourhood of Colombo. According to Jerdon, 1864, occasionally seen in the Bay of Bengal, where Blyth later described it as 'common'. However in the British Museum there is only a single specimen actually collected in the Bay of Bengal.

GENERAL HABITS. The flight resembles that of a large shearwater. The birds hunt in groups of five to fifteen strung out in single file, flying with strong regular wing strokes low over the surface, plunging from the air and chasing the quarry under water. Most fishing done in the evening or early hours of the night. Sometimes gatherings of three or four hundred birds over a large shoal of fish. Unlike other boobies, nests chiefly in bushes and trees.

FOOD. Mainly squids (cephalopods), and fish. For more details of bionomics see Murphy 1936: 861-70; Gibson-Hill 1947: 115-19.

MUSEUM DIAGNOSIS. See Murphy 1936: 861-2.

MEASUREMENTS

| | Wing | Bill (from feathers) | Tarsus | Tail |
|-----|---------|-------------------------|----------|------------------------|
| ♂ ♀ | 403-421 | 90-97, once 88 | c. 40-43 | 219-228 mm. (Baker) |

COLOURS OF BARE PARTS. Iris dark brown; rest as under Field Characters. Further details in Gibson-Hill, 1947: 116.

25. Brown Booby. *Sula leucogaster plotus* (Forster)

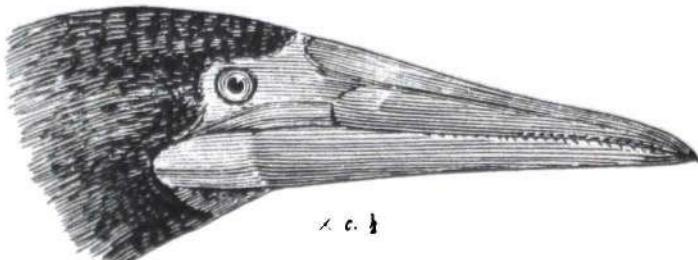
Pelecanus plotus Forster, 1844, Descr. Anim., ed. Licht.: 278 (near New Caledonia)
Baker, FBI No. 2184, Vol. 6: 285

OTHER NAMES. Brown Gannet; Common Booby.

SIZE. Large gull; length c. 76 cm. (30 in.).

FIELD CHARACTERS. The commonest booby in most tropical seas.

Adult. *Above*, dark chocolate-brown; primaries blackish. *Below*, neck and upper breast chocolate-brown; rest white including undersurface of black-margined wings. Sexes alike; male somewhat smaller.



Young (immature) largely dusky brown; difficult to distinguish from other species in immature plumage.

STATUS, DISTRIBUTION and HABITAT. Breeds on islands in the Indian and Pacific oceans, e.g. Christmas and North Keeling. Occurs uncommonly

in the Bay of Bengal. Recorded in the Arabian Sea off the Oman coast, $19^{\circ}41'N.$, $59^{\circ}38'E.$ and $23^{\circ}29'N.$, $64^{\circ}44'E.$ in December (A. O. Gross, 1960, *Audubon Magazine*, Nov.-Dec.). A specimen has been taken on 'the Malabar Coast'. Recorded several times from the west coast of Ceylon during the NE. monsoon. Also on the Maldive and Laccadive islands.

GENERAL HABITS. Usually seen singly or in small groups of up to a dozen birds or so. Rather more solitary in its hunting than the Redfooted Booby. Like others of the family catches its food — mainly flying fish and squids (cephalopods) — by diving from 25 to 35 metres up in the air and subsequent underwater pursuit. Nests on the ground in the open, on sea cliffs etc.

For an excellent account of its bionomics see Gibson-Hill 1947 : 109-15.

MUSEUM DIAGNOSIS. For plumages etc. see Murphy 1936: 854 for the nominate race *leucogaster* from which *plotus* differs only in details. Also Gibson-Hill 1947, 1950.

MEASUREMENTS

| | Wing | Bill (from feathers) | Tarsus | Tail |
|------|------------------------|-------------------------|---------|-------------|
| 5 ♂♂ | 392-398 (av. 395.2) | 96-101 | 41-45 | 198-210 mm. |
| 4 ♀♀ | 406-426 (av. 417.5) | 102-107 | 44-45.5 | 204-227 mm. |

COLOURS OF BARE PARTS. Iris (both sexes) grey; eyelids dull blue. Bill: ♂ light greenish grey, ♀ slightly paler with tip almost white. Facial, ramal, and gular skins: ♂ dark purple, ♀ light greenish yellow often with a slightly darker patch in front of and below the eye. Legs and feet: ♂ pale arsenic green, ♀ pale yellowish green (Gibson-Hill 1950: 235).

Family PHALACROCORACIDAE: Cormorants and Darter

Gregarious, fish-eating, colonial-nesting water birds. All our Indian species are characterized by black plumage, whence collectively known in Hindi as *pān-kowwa* or *jāl-kowwa* (water-crow).

Bill laterally compressed, rather long, slender and pointed; hooked at tip in cormorants, stiletto-like in the darter or snake-bird. Nostril obsolete. A gular pouch in cormorants, naked anteriorly. Neck and body long, rather spindle-shaped; wings of moderate length. Tail long and stiff. Legs short; feet large, pelecaniform, with all four toes united in a web for swimming; claws much curved. Sexes alike. Stance of bird when perched on tree or rock more or less upright.

Plumage less dense or resistant to water than in ducks and many other swimming and diving birds. Becomes permeated by prolonged immersion and requires constant drying out.

Further morphological details in Stresemann 1927-34, Aves: 804, 875; Van Tyne & Berger 1959: 401; Witherby 1940, 4: 1-2.

Within our area found mainly on inland waters — jheels, rivers, irrigation reservoirs, etc. Rarely also on brackish lagoons and tidal creeks. Expert divers. Unlike grebes, swimming under water with use of wings, literally flying beneath the surface, in pursuit of fish. The flight of cormorants, with neck stretched out in front, is powerful, sustained, and rather goose-like in profile as well as head-on, but the birds rise with some difficulty, flapping heavily along the surface to get airborne. When alighting on the water, the long stiff tail is first to break the surface and helps to check momentum.

PELECANIFORMES

BREEDING. In mixed colonies or heronries with storks, egrets, herons, ibises, etc. *Nests*, skimpy to fairly substantial stick platforms lined with water weeds in trees, rarely on rocks. *Eggs*, 2 to 6, pale blue or pale green overlaid by a chalky layer. Incubation by both sexes. Young *nidicolous*, naked at hatching, down-covered later; extraordinarily ugly throughout. Fed by both sexes by regurgitation, the chick inserting its head into the parent's gullet, wrestling vigorously with its wings flapping, and not letting go till the parent breaks off with an effort. Nestlings beg excitedly by shaking and swaying their upraised scrawny necks from side to side and tickling the parent's bill to induce disgorgement.

Adults commute long distances to forage for the voracious insatiable young, flying out and back all together in goose-like V-shaped echelons or wavy diagonal lines — a common sight at heronries in the mornings and evenings.

Cormorants are notorious for their prodigious appetites, and their degradations on local fish populations can be potentially devastating. Nevertheless, the wholesale indiscriminate persecution of the birds on this account, without a proper scientific inquiry, is unjustified. Investigations on the food and feeding habits of these and other piscivorous birds elsewhere have shown that the majority of fishes taken are of low economic worth, or which themselves often constitute a far greater menace to the spawn and fry of valuable food fishes than the birds.

Key to the Indian forms

| | Page |
|---|---|
| A Large (c. 80 cm.=32 in.); glossy black above and below, flanks white..... | <i>Phalacrocorax carbo sinensis</i> (breeding) 37 |
| B Mostly smaller; glossy black above and below, flanks not white..... | 1 |
| C Plumage darker above than below..... | 2 |
| D Plumage lighter above than below..... | 3 |
| 1 Throat speckled, head and neck black, yellow gular skin, head not crested (c. 57-63 cm.=23-25 in.) | <i>P. fuscicollis</i> (winter) 39 |
| Throat black, patches of white feathers or plumes on head, with or without yellow gular skin, head noticeably crested..... | a |
| Throat white, no markings on sides of head, with or without yellow gular skin | b |
| a Pure white tufts of feathers on each side of neck behind ear-coverts, yellow gular skin (c. 57-63 cm.=23-25 in.) | <i>P. fuscicollis</i> (breeding) 39 |
| Scattered silky white plumes on forecrown and sides of head, no yellow gular skin (c. 51 cm.=20 in.) | <i>P. niger</i> (breeding) 41 |
| b Yellow gular skin (c. 80 cm.=32 in.) | <i>P. carbo sinensis</i> (winter) 37 |
| Yellow gular skin lacking (c. 51 cm.=20 in.) | <i>P. niger</i> (winter) 41 |
| 2 Brown above and paler brown or whitish below..... | c |
| c Dull brown above, more or less white below, yellow gular skin, wing over 310 mm..... | <i>P. carbo sinensis</i> (juvenile) 37 |
| Scaly brown above, whitish below, flanks mottled brown and white, chin and throat white, foreneck brown with white streaks, | |

| | | |
|--|--|----|
| wing over 250 mm. but under 300 mm..... | | |
| | <i>P. fuscicollis</i> (juvenile) | 39 |
| 3 Snake-like neck, straight pointed bill, pale brown head and neck, blackish feathers of upperparts streaked with silver brown, underparts dark brown or blackish..... | <i>Anhinga rufa melanogaster</i> (adult) | 43 |
| Underparts paler..... | <i>A. rufa melanogaster</i> (juvenile) | 43 |

Genus PHALACROCORAX Brisson

Phalacrocorax Brisson, 1760, Orn. 1: 60. Type, by tautonymy, *Phalacrocorax* Brisson = *Pelecanus carbo* Linnaeus

General characters as of the Family. Bill moderately long, rather slender and compressed; culmen rounded and sharply hooked at end, with a narrow groove on each side, bifurcating at the dertrum or nail, the lower branch running down to the commissure. A gular pouch, naked anteriorly. Wing of moderate length: 2nd primary (as.) usually longest. Tail rounded or wedge-shaped, of 12 or 14 very stiff feathers. Tarsus short and compressed; toes flattened; claws much curved.

Genus cosmopolitan; represented within our limits by three species. (See Key, above.)

26. Large Cormorant. *Phalacrocorax carbo sinensis* (Shaw)

Pelecanus sinensis Shaw, 1801, Nat. Misc. 13: pl. 529, text (China)

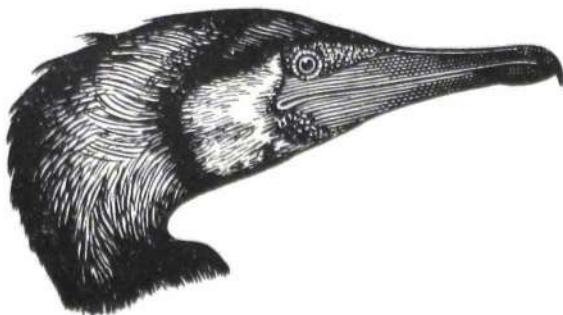
Baker, FBI No. 2180, Vol. 6: 277

Plate 2, fig. 3, facing p. 32

LOCAL NAMES. *Ghogur*, *Pān-kowwa*, *Jāl-kowwa* (Hindi); *Wādā silli* (Sind); *Neiār* (Kashmir); *Bontakāki* (Telugu); *Di dao-kwa* in Cachar, *Pāni kaori*—all cormorants—in Nowgong (Assam); *Pān-kauri*, for cormorants and shag (Bengal).

SIZE. Large duck; length c. 80 cm. (32 in.).

FIELD CHARACTERS. A thick-set duck-like black water bird with a slender bill, hooked at tip, and longish stiff tail. Swims low on water with only the longish neck and a thin slice of the back showing. Settles on rocks, sand-banks, and trees with an upright carriage. Often seen thus with wings and tail spread out to dry.



x c. 1

Adult (breeding). Above and below black with metallic bluish or greenish sheen, with a broad white patch on posterior flanks. Head, crest, and neck,

more or less mixed with silky white feathers. Facial skin and throat white; gular pouch bright yellow.

Large size, white sides of face, yellow gular pouch, and white oval thigh patches diagnostic at rest as well as in flight.

In winter (non-breeding) plumage the hoariness of the head and neck, and the white thigh patches disappear; the yellow gular pouch becomes less bright. Then differentiated from our other cormorants chiefly on size.

Young (1st year). Dull brown above; more or less white below, progressively becoming browner and then blacker everywhere. Fully adult breeding plumage apparently attained in the fourth year.

STATUS, DISTRIBUTION and HABITAT. Resident and locally migratory, practically throughout our area. In Kashmir, Ladakh and Nepal on lakes at considerable elevations (e.g. Satpur in Baltistan, 11,300 ft. (c. 3450 m.) Meinertzhagen), and on the rivers debouching into the plains, and far up their gorges. Right across the Gangetic Plain to eastern Assam, south through the Peninsula, and in Ceylon. Ticehurst's observations at Karachi (*Ibis* 1923: 458) suggest that there may be a regular seasonal influx of extralimital migrants in winter, augmenting the resident population.

Frequents large inland waters — Himalayan torrents and lakes, and lowland rivers, jheels, irrigation reservoirs, etc. Also tidal lagoons and salt pans.

Extralimital. From Holland through central and southern Europe to central Asia; Burma, Thailand, Indochina and Malaysia to China. The species, in several geographical races, is found in North America, Europe, Asia, northern Africa, and Australia.

GENERAL HABITS. Usually met with in ones and twos, or small flocks of up to 8 to 10; seldom bigger. But very large congregations collect to breed at traditional heronries such as Keoladeo Ghana in Bharatpur (Rajasthan). Hunts fish by diving and underwater pursuit. From the surface, where the bird swims low down on the water, only the neck showing and the body almost completely submerged, it takes a little upward leap before plunging to dive, often remaining below for many seconds at a time. Sometimes joins in the concerted community hunts of its smaller relatives. When satiated, has been observed to dive and catch a catfish about 15 cm. long and play with it as a cat does with a mouse. The bird swam ashore with the fish, dropped it struggling on the bank, picked it up again and carried it back into the water, released it and dived after it, caught it again and brought it ashore, then leisurely repeated the whole performance several times before swallowing it. Normally silent in the non-breeding season. See also under Family.

For courtship display and general bionomics see Witherby 1940, 4: 2-10.

FOOD. Almost exclusively fish.

BREEDING. Gregariously in many localities throughout the country, the larger heronries becoming traditional and resorted to year after year. Season, mainly between September and February dependent on the monsoons, the filling up of jheels, and the availability of fish supply for the young. Recorded as follows: Sind (Eastern Narra dist.), November; N. India (Bharatpur), September-December; Madras (Vedanthangal), January-February; Assam (Subansiri river), December; Ceylon (North-

central Province), December. *Nest.* An untidy, comparatively massive deepish platform of twigs about 50 cm. in diameter, lined with water weeds etc. Built colonially, often in mixed heronries cheek by jowl with its own species and other water birds, the nests sometimes touching one another. Usually, however, a tendency to segregation into discrete *mohallas* is noticeable. Normally in trees standing partially submerged, but an unusual colony of hundreds of nests on ledges of rocks flanking the Subansiri river in Assam is described by Baker 1935 (4: 425-8). *Eggs*, 3 to 5, sometimes 6, long ovals, more or less equal at both ends, pale blue-green in colour, overlaid with a white chalky layer, becoming stained and dirty during incubation. Average size of 100 eggs 60.6×39.3 (Baker). Incubation period 23-24 days. Both sexes partake in incubation and feeding the young. As in all cormorants, the hatchling is extraordinarily ugly — naked at first, covered with black down a few days later. According to Heinroth five weeks in nest; full fledged at two months. Nestlings demand food from incoming parent by violently worrying and tickling — 'attacking' — its yellow throat-patch to the accompaniment of a persistent wheezy *chooee, chooee, chooee* — almost a whistle.

MUSEUM DIAGNOSIS. For details of plumages, moults, etc. of the nominate race see Witherby 1940, 4: 5-7, 10.

In breeding plumage our race *sinensis* differs from the above (of the northern Holarctic Region) by its head and neck being much whiter. In winter plumage the two are indistinguishable in the field.

MEASUREMENTS. Dr C. B. Ticehurst gives for birds from India and Muscat:

| | Wing | Bill | Tarsus | Tail |
|-----|---------|-----------|---------|-------------------------|
| ♂ ♀ | 319-364 | 57-72 mm. | [62-71] | 140-155 mm. (Baker)] |

COLOURS OF BARE PARTS. Iris green; eyelids dusky yellow. Bill dark horny brown, the lower mandible except the tip pinkish- or yellowish-white. Skin of pouch black and yellow, patched in varying degree, occasionally all yellow. Legs and feet black.

MISCELLANEOUS. Longevity (*P. c. carbo*), 18 + years (*Ring*, 33: 148 — 1962).

27. Indian Shag. *Phalacrocorax fuscicollis* Stephens

Phalacrocorax fuscicollis Stephens, 1826, in Shaw's Gen. Zool. 13 (1): 91 (Bengal)

Baker, FBI No. 2181, Vol. 6: 279

LOCAL NAMES. Same as for the preceding, often with a prefix meaning small.

SIZE. Duck +; length c. 63 cm. (25 in.).

FIELD CHARACTERS. Smaller than the preceding. Distinguished from Little Cormorant (28) by longer, slenderer bill and sloping forehead.

Adult (breeding). *Above*, glistening bronze-black. *Below*, shiny jet black. A pure white tuft of feathers on each side of neck behind ear-coverts, and a few white specks on head. On closer view, in good light scalloped or scaly effect on back and wings (produced by darker edging to the feathers) perceptible. In non-breeding plumage distinguished from Large Cormorant chiefly on size; from Little Cormorant by bigger size, yellow gular skin, and white-speckled throat. Sexes alike.

Young (immature). *Above*, scaly bronze-brown, tail and primaries blacker. *Below*, chiefly white, with the flanks mottled brown and white.

The three species are difficult to distinguish in the field in non-breeding plumage, without size comparison, and sometimes liable to be confused *inter se*.

STATUS, DISTRIBUTION and HABITAT. Resident, moving locally with conditions of water and fish supply, throughout the subcontinent from Sind in W. Pakistan to eastern Assam, south through the Peninsula, and in Ceylon. Not in the Himalayas except in the foothills where the larger rivers debouch into the plains. May occur in the peninsular and South Indian hills on the newly constructed dammed reservoirs among the Small Cormorants usually present there.

Frequents jheels, rivers, irrigation tanks, tidal estuaries, etc. by itself or in company with either or both the other cormorants. Abundant in Karachi harbour at certain times of the year.

Extralimital. Burma south to Tenasserim.

FOOD. Mainly fish.

GENERAL HABITS. As of the Family (q.v.). More gregarious than the Large Cormorant, oftener seen in flocks of large size and in association with its smaller relative, the two species frequently hunting together. The communal hunt, or battue, consists of a party of the birds hemming in a shoal of fish, or intercepting it as it gushes from the sluice gate of an irrigation reservoir, diving feverishly with little upward leaps and chasing the fish under water. Great havoc is wrought amongst the quarry as one bird after another plunges after them with energy, each to reappear presently with a struggling silvery form held crosswise in the bill. This is quickly shifted into position and swallowed head foremost with an upward jerk of the bill; presently the bird dives once more. The manoeuvre is repeated again and again till the birds are sated, when they will sit about on a sandbank or on rocks or trees in the characteristic upright posture, wings and tail spread open to dry, preening themselves and waiting for appetite to return.

BREEDING. Season, overall July to February; as in the preceding and in allied water birds generally, depending on early or late monsoon rainfall and local water conditions. Usually August to October in northern India; November to February in the south and in Ceylon. Nest, an untidy platform of twigs, rather like a crow's nest, sometimes scantily lined with grass roots and water weeds. Built in trees either in small colonies of its own or — as in Keoladeo Ghana (Rajasthan) — in enormous mixed heronries or 'rookeries' covering an extensive area of swamp with the partially submerged trees loaded down with thousands of nests and hundreds of thousands of water birds of numerous species — all three cormorants, darters, storks, herons, etc. There are often 30 to 50 nests of cormorants and other species in a single moderate-sized tree, closely packed and tier upon tier, the lower ones soon getting besouled and caked with the rain of excreta from above. Eggs, 3 to 5 or 6, pale bluish green with a chalky surface, smaller replicas of the Large Cormorant's. Average size of 100 eggs $51 \cdot 3 \times 33 \cdot 2$ mm. (Baker). Both sexes incubate. Incubation period not recorded. Chicks naked at hatching, soon becoming clothed in sooty black down.

MUSEUM DIAGNOSIS. See Key (above) and Baker, loc. cit.

MEASUREMENTS

| | Wing | Bill (from feathers) | Tarsus | Tail |
|----|---------|--------------------------|----------|-------------|
| ♂♀ | 257-276 | 50-61 generally 54-58 | c. 47-52 | 132-144 mm. |

Weight 5 ♂♀ 600-790 g (av. 706) — BNHS.

COLOURS OF BARE PARTS. Iris green or blue-green. Bill dark brown, base of lower mandible reddish horny, gular skin yellow; naked skin of face black-purplish in the breeding season, yellowish at other times. Legs and feet black (Baker).

28. Little Cormorant. *Phalacrocorax niger* (Vieillot)

Hydrocorax niger Vieillot, 1817, Nouv. Dict. Hist. Nat. 8: 88 (East Indies = Bengal)

Baker, FBI No. 2182, Vol. 6: 280

Plate 2, fig. 2, facing p. 32

LOCAL NAMES. *Pān kowwa, jogrābī* (Hindi); *Pān kawri* also for shag (Bengal); *Neetikāki* (Telugu); *Kādāl kāgām, Neer kāgām* (Tamil); *Diya kawa* (Sinhala); *Kākātārāvū* (Malayalam).

SIZE. Jungle Crow +; length c. 51 cm. (20 in.).

FIELD CHARACTERS. Smaller size, comparatively shorter, stouter bill, domed forehead, longer tail, and absence of yellow on gular skin distinguish it from the Shag. Size difference perceptible only when the two seen together.

Size difference perceptible only when the two seen together.

Adult (breeding). Black overall with a bluish or greenish sheen. Upper back and wing-coverts dark silvery grey, scalloped with black. A short crest on occiput and nape and a few scattered silky white feathers and plumes on forecrown and sides of head. In non-breeding plumage crest and white feathers in head disappear, and throat becomes white. Sexes alike.

Young (immature). Above, brown, the back with paler scalloping. Below, paler, with throat and centre of abdomen white.

Chick (c. one week old). Head bald shiny livid red, with naked scrawny neck. Body covered with dingy black down.

STATUS, DISTRIBUTION and HABITAT. Resident, with local movements depending on water conditions. Found through the subcontinent and in Ceylon. Absent in the Himalayas and northern West Pakistan. Affects jheels, rivers, irrigation reservoirs and canals, village tanks, tidal estuaries, etc.

Extralimital. Burma, Thailand, Indochina, Malaysia, Indonesia east to the Greater Sunda Islands.

GENERAL HABITS. As of the Family (q.v.) and very similar to the preceding, with which it commonly associates and is frequently confused. Solitary birds, or twos and threes on village tanks and tidal estuaries, to great flocks on the larger inland waters, and enormous congregations at the traditional rookeries, e.g. Keoladeo Ghana in Rajasthan and Vedanthangal in Madras State. When not on water, usually seen perched upright on trees, stakes, or rocks, sunning themselves, wings and tail spread open. In the feverish jostling during the communal hunts, in which densely packed rabbles participate, the birds often leap-frog over their fellows in their eagerness to plunge after a shoal of fish — manoeuvres reminiscent of starlings at a swarm of grasshopper nymphs.

PELECANIFORMES

FOOD. Mainly fish; to a lesser extent also tadpoles, frogs, and crustaceans.

BREEDING. *Season*, chiefly July to September in W. Pakistan and N. India; November to February in the south; December to May in Ceylon. *Nest*, an untidy stick platform about 25 cm. in diameter indistinguishable from that of the Shag, as also are the eggs though somewhat smaller. Average size of 100 eggs 44.8×29.0 mm. (Baker). Normal clutch 3 to 5. The nest is too small to contain the full complement of young when fairly grown. When an observer approaches a nest-tree these crowded youngsters, as well as brooding birds from adjoining nests, tumble plumb down into the water beneath, scraping through the thorny branches. The adults dive, or flap and patter along the surface to take off with the usual effort. The young soon manage to clamber back into the nest-tree using their pliant feet with the sharp hooked claws, the chin, and the stumpy wings to support and pull themselves up the branches. In addition to nesting in enormous mixed colonies at swamps, sometimes in multitudes dense enough to blacken acres of denuded trees, the Little Cormorant also nests singly and in smaller numbers on trees standing high and dry in the midst, or on the outskirts, of inhabited villages at considerable distances from water, in the usual company of Cattle and White egrets. Baker found an exceptional breeding colony in a swampy reed-bed in Assam. Here the nests were placed about 1.5 metres above the water on masses of broken-down elephant grass, the colony being completely screened from view by the tall growth. Both sexes partake in nest-building, incubation and care of the young. Incubation period not recorded. The marked disparity in growth of chicks of the same brood suggests that the eggs are laid at longer intervals than 24 hours and that incubation commences with the first egg. Brooding from the first egg must also serve to protect the clutch from nest marauders like the House Crow which is a very serious menace at heronries all over the country.

MUSEUM DIAGNOSIS. For plumages see Baker, loc. cit.; Robinson and Chasen 1936, 3: 246.

MEASUREMENTS

| | Wing | Bill (from feathers) | Tarsus | Tail |
|-----|-----------------------|-------------------------|--------|-------------|
| ♂ ♀ | 181-205 (once 212) | 29-34 | 35-40 | 133-146 mm. |

Weight 5 oo? 360-525 g (av. 427) — BNHS.

COLOURS OF BARE PARTS. Iris green. Bill horny brown, blackish at tip, livid purple at base. Gular and orbital skin black (non-breeding), purple (breeding). Legs and feet blackish, tinged with purple flesh colour when breeding (Baker).

28a. Pygmy Cormorant. *Phalacrocorax pygmaeus* (Pallas)

Pelecanus pygmaeus Pallas, 1773, Reise versch. Prov. Russ. Reich, 2: 712, pl. G
(Caspian Sea)

Not in Baker, FBI

LOCAL NAMES. None recorded.

SIZE. Little Cormorant ±.

FIELD CHARACTERS. In winter doubtfully distinguishable from Little Cormorant, see Museum Diagnosis.

STATUS, DISTRIBUTION and HABITAT. Rare vagrant (?) to West Pakistan. A single specimen in the BNHS collection (o? 3. ix. 1917, Gujar, Mashki, 165 m. SSW. of Kalat, Baluchistan — J. E. B. Hotson) is the only record for our area (JBNHS 62(3): 553).

Extralimital. SE. Europe, Black and Caspian Seas, Middle East, Afghanistan, Russian Turkestan, Algeria, Tunisia.

GENERAL HABITS. Similar to Little Cormorant.

BREEDING. Extralimital.

MUSEUM DIAGNOSIS. As for Little Cormorant, but feathers of scapulars and upper wing-coverts graphite grey, fringed or scalloped with black. *Winter*, glistening black with white throat and rusty brownish breast. *Summer* (breeding), head dark rusty brown.

MEASUREMENTS

| | Wing | Bill (from feathers) | Tarsus | Tail |
|---------------------|--------------|-------------------------|--------|-------------|
| ♂ ♀ | 200-207 | 28-31 | c. 36 | 140-147 mm. |
| Outer toe with claw | c. 53-56 mm. | | | (Hartert) |

COLOURS OF BARE PARTS. Iris dark brown (not green), sometimes almost blue-black. Legs and feet black.

Genus ANHINGA Brisson¹

Anhinga Brisson, 1760, Orn. 1: 60, 6: 476. Type, by tautonymy and monotypy
Anhinga Brisson = *Plotos anhinga* Linnaeus

Bill slender, straight, very sharp-pointed with both margins of commissure toothed near tip. No lateral groove; nostrils small, basal and linear. Neck very slender with a bend or kink at the 8th and 9th vertebrae. Wing pointed: 3rd primary (as.) longest. Scapulars elongate and lanceolate. Tail long, cuneate in shape, of 12 stiff feathers.

29. Darter or Snake-bird. *Anhinga rufa melanogaster* Pennant

Anhinga melanogaster Pennant, 1769, Indian Zool.: 13, p. 12 (Ceylon and Java)
Baker, FBI No. 2183, Vol. 6: 282
Plate 2, fig. 6, facing p. 32

LOCAL NAMES. *Pānwa*, *Pān dūbi* (Hindi); *Silli* (Sind); *Goyār* (Bengal); *Pāmūbātū* (Telugu); *Chakuri* (Southern Gonds); *Pāmbūttāra* (Tamil, Ceylon); *Diya kawa*, *Belli kawa* (Sinhala); *Maniori*, *Begiagir* (Assam).

SIZE. Duck +; length c. 90 cm. (36 in.).

FIELD CHARACTERS. A black water bird like the cormorant, with longer, slenderer snake-like neck, narrow head, and straight, pointed stiletto-shaped bill. Tail long, stiff, fan-shaped.

Adult. *Above* black, the back and wings longitudinally streaked and speckled with silver-grey; head and neck velvety chocolate-brown

¹ Treated by some authors under a separate family, Anhingidae, by others in a subfamily of Phalacrocoracidae (Anhinginae), or merely a genus as here.

with white chin, throat, and a narrow white line from behind eye halfway down each side of neck. *Below*, shiny black. Sexes alike.

Young (immature). *Above*, dark brown, head and neck paler (whitish), mantle narrowly and dully streaked with rufous and silver-grey. *Below*, brown; tail tipped paler.

STATUS, DISTRIBUTION and HABITAT. Resident, with local movements depending on water conditions. Found throughout the subcontinent from W. Pakistan to E. Assam (from c. 300 m. in the Himalayas), southward through the Peninsula, and in Ceylon.

Frequents inland waters — swamps, jheels, rivers, irrigation reservoirs, village ponds, etc.

Extralimital. Burma, Thailand, Indochina, Malaysia, Celebes (Sulawesi). Other races in Africa, Madagascar, Middle East.

GENERAL HABITS. Keeps singly, in scattered twos and threes, or large congregations, depending on living conditions. More individualistic than cormorants, and does not hunt in cooperative bands. Swims with body submerged, only the snake-like head and neck showing above the surface, constantly turning from side to side. An expert diver and underwater swimmer using the feet to propel itself in pursuit of prey, wings held half open. Unlike cormorants (and grebes) does not leap upward before plunging to dive; merely stretches neck horizontally and quietly vanishes below surface leaving hardly a ripple. When chasing fish under water, sways neck back and forth like a javelin-thrower poised to throw. A special structure in the vertebrae of the neck enables the sharp bill to be shot out as by a powerful spring. The quarry is transfixed on the stiletto-like mandibles. It is jerked off smartly when the bird surfaces, shaken into position, and swallowed head foremost. Though needing some initial effort in the take-off, flies strongly with quick flaps punctuated with sailing, tail spread fanwise, and slender neck with the characteristic kink in the middle stretched in front. When satiated perches upright on a tree-top or snag like cormorants, sunning itself with outspread wings and tail. As in cormorants, and strangely enough for such specialized aquatic birds, the plumage is permeable to water and needs constant drying. Occasionally spirals up on a thermal to lofty heights and circles on motionless wings along with storks and pelicans, obviously for fun.

When a tree on which darters are resting is approached, the birds hurl themselves into the water below, dragging through the intervening tangle of thorny branches as if shot dead. They go right under, but presently the snake-like necks reappear one by one in the distance. It is possible that some of such birds may be moulting their wing quills and temporarily flightless (see Moult).

VOICE. Seldom heard except when nesting, a loud disyllabic *chigi, chigi*, *chigi*, etc. recalling the beginning of a guinea-fowl's cackle; and various grunts and croaks besides. Nestlings also very noisy when begging food.

FOOD. Almost exclusively fish, including some seemingly much too large for the bird's slender bill and gullet.

BREEDING. *Season.* June/July to December in W. Pakistan and N. India; November to February in the south; January to March in Ceylon. *Nest*, a largish twig platform built on trees standing in or near water, often

gregariously, among large mixed heronries, e.g. Keoladeo Ghana, Rajasthan, the nests almost touching one another on the overcrowded trees. Eggs, 3 to 6, elongated, spindle shaped, pale greenish blue with a whitish chalky coating, becoming soiled and dirty during incubation. Average size of 80 eggs 52.9×33.5 mm. (Baker). Both sexes partake in incubation and feeding the young. Incubation period unrecorded. As in the Little Cormorant, there is great disparity between nestlings in the same brood. Incubation commencing with the first egg is of survival value against nest-robbers like House Crows, and also against the fierce midday sun. Chicks blind and naked when hatched, except for some straggly down on head. White down acquired in a few days, persists on head, neck, and underparts even after wing and tail quills sufficiently grown for chicks to fly. Feeding by regurgitation, the bill and head of chick being thrust violently into parent's gullet.

On arrival of foraging parent at nest, the chicks jostle for food, upstretching neck, vigorously shaking and swaying it in a kind of St Vitus's dance, and tickling the parent's throat. Parent lowers and opens bill wide, allowing chick to thrust its entire head into the elastic gullet. The irritation within apparently induces a retching effect, helping parent to bring up food. The swaying and tugging extraction process lasts for several seconds, the parent having to back away forcibly from the importunate young. Several visits by both parents needed to satisfy the voracious brood. Nest young also require frequent quenching of thirst. Water is squirted in jets from parent's bill into gullet of chick, sometimes spilling outside in the process. On fright chicks, even when quite small, disgorge the food they have eaten into the water below like hailstones, sometimes even hurling themselves bodily as well. Many of the smaller chicks perish through inability to swim and to clamber back to the nest. Adolescents usually manage to do so, using their pliant feet and sharp-hooked claws, chin and neck, and the stumpy forelimbs to haul themselves up the trunk and branches, becoming gory in the process if the nest tree happens to be a thorny one such as babool or *Prosopis*.

At the Keoladeo heronry in Rajasthan heavy predation of nestlings is caused by Pallas's Eagle (*Haliaeetus leucoryphus*), a few pairs of which are permanently established there. They appear to specialize in darter squabs particularly when half to three-quarters grown.

MUSEUM DIAGNOSIS. See Baker, loc. cit.; Van Tyne & Berger 1959: 402; Stresemann 1927-34, Aves (morphology).

MOULT. Like most Anseriformes and some other groups, the Darter moults all its wing quills simultaneously after breeding and is flightless for some weeks till these have been replaced by new feathers.

MEASUREMENTS

| | Wing | Bill (from feathers) | Tarsus | Tail |
|--------|------------------------------|-------------------------|--------|-------------|
| ♂♀ | 331-357 | 74-90 | 42-47 | 202-240 mm. |
| Weight | 4 oo? 1160-1500 g (av. 1340) | BNHS. | | (Baker) |

COLOURS OF BARE PARTS. Iris, inner ring white, outer yellow. Bill dark horny brown; terminal half black, lower mandible yellowish. Legs and feet black.

MISCELLANEOUS. Darters are regularly employed by local wandering tribes in parts of Assam and Bengal for catching fish in swamps and small

lakes (Stonor, JBNHS 47: 746). The practice is not widespread and fast dying out.

Family FREGATIDAE : Frigate Birds or Man-of-war Hawks

Rather large, gregarious, dark coloured or black-and-white oceanic birds with long, pointed, streamlined wings, deeply forked tails, and flight resembling that of raptors. Bill long and strongly hooked, rounded in cross-section, the culmen convex. Nostrils obsolete. Throat bare; bright coloured gular pouch occasionally inflated like a balloon to ridiculous proportions by courting male, even in flight. Tarsus very short, stout, feathered. Feet small, all four toes united by a web near their base; claws long, strong, much curved; middle claw pectinate as in tropic-birds and cormorants.

Sexes dimorphic; female larger than male. For anatomical details see Baker 1929, 6: 295; Palmer 1962, 1: 365-6.

RANGE. Pan-tropical. Oceanic islands and adjacent seas. Non-migratory.

GENERAL HABITS and FOOD. Chiefly fish and squids (cephalopods) neatly picked up from surface shoals with an inward flick of the strongly hooked bill while hovering close above the water. Sometimes flying fish chased and captured in the air. More usually food procured by pirating — attacking and chasing boobies, tropic-birds, etc. and forcing them to give up what they have caught. The booty is swooped off in mid-air before it reaches the water, or scooped up from the surface as it falls. They also swoop and carry off the young of colonial-nesting birds such as terns.

Frigate birds are magnificent fliers and capable of soaring and sailing for hours at a stretch high up in the heavens. Owing to their short legs and long wings they cannot take off from a flat surface, therefore they hardly ever alight on a calm sea, spending almost all day on the wing. They roost at night on trees and bushes, and also build their stick nests in similar situations, and on rocks. *Eggs*, usually 1 (or 2), chalky white. Incubated by both sexes. Incubation period about 6 weeks. Chick blind and naked at hatching; covered with white down later.

Key to the Indian forms

| | Page |
|--|------|
| A Upperparts uniformly dark except for white band across hindneck | 1 |
| B Upperparts uniformly dark, no white band across hind neck | 2 |
| C Head, neck, and underparts white or rusty white, rest of upperparts dark. Brown or rusty markings of neck sometimes becoming darker and forming broad band across chest..... | |
| Juvenal plumage of all three species | |
| 1 Throat black, breast and abdomen white..... <i>F. andrewsi</i> (female) | 47 |
| Throat black, breast white, abdomen black..... | |
| <i>F. ariel iredalei</i> (female) | 49 |
| 2 Underparts uniformly dark..... <i>F. minor aldabrensis</i> (male) | 47 |
| Underparts not uniformly black..... ^a | |
| a Throat, breast, and abdomen black, flanks white..... | |
| <i>F. ariel iredalei</i> (male) | 49 |
| Throat whitish, breast white, abdomen black..... | |
| <i>F. minor aldabrensis</i> (female) | 47 |
| Throat black, breast black, abdomen white..... | |
| <i>F. andrewsi</i> (male) | 47 |

Genus **FREGATA** Lacépède

Fregata Lacépède, 1799, Tabl. Ois. : 15. Type, by subsequent designation,
Pelecanus aquilus Linnaeus

Characters as of the Family.

30. **Christmas Island Frigate Bird.** *Fregata andrewsi* Mathews

Fregata andrewsi Mathews, 1914, Austr. Av. Rec., 2: 120
 (Christmas Island, Indian Ocean)

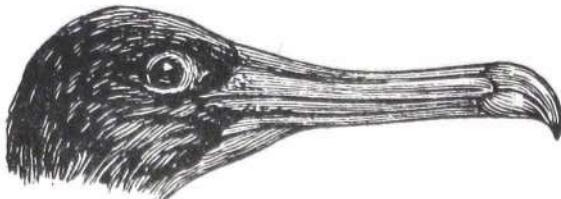
Baker, FBI No. 2191, Vol. 6: 295

SIZE. Kite +; length ♂ c. 97 cm. (38 in.); ♀ c. 102 cm. (40 in.).

FIELD CHARACTERS.

Male (adult, breeding). *Above*, glossy metallic black. *Below*, throat and breast black, only the belly white.

Female (adult). Larger than male. *Above*, same as ♂. *Below*, only throat black, rest of underparts white, the white spreading up as a collar on sides of neck (to clavicular region), not across hindneck.



× c. $\frac{1}{4}$

STATUS, DISTRIBUTION and HABITAT. Vagrant; possibly storm-driven. Breeds on Christmas Island (Indian Ocean) south of Java, c. 11°S. The record from Kerala (Prater, JBNHS 33: 446, and Synopsis: 11) proves on a re-examination of the specimen to relate not to this species but to *Fregata minor* (Abdulali, JBNHS 57: 667-8). Similarly the only Ceylon specimen in the Colombo Museum, hitherto recorded as *F. andrewsi*, has been shown to be *F. minor aldabrensis* (Phillips 1953). Therefore it must be emphasized that so far no authentic record of *Fregata andrewsi* in Indian waters exists.

MUSEUM DIAGNOSIS**MEASUREMENTS**

Wing ♂ 600-625; ♀ 635-643 mm. (Baker). Average of wing of 10 mature specimens ♂ 610; ♀ 650 mm. (Gibson-Hill 1947).

(For an excellent and complete biography of this species see C. A. Gibson-Hill 1947.)

31. **Lesser Frigate Bird.** *Fregata minor aldabrensis* Mathews

Fregata minor aldabrensis Mathews, 1914, Austr. Av. Rec., 2: 199 (Aldabra Island)
 Baker, FBI No. 2192, Vol. 6: 297

OTHER NAME. Great Frigate Bird (!).

SIZE. Kite +; length c. 87-102 cm. (34-40 in.).

FIELD CHARACTERS.

Male (adult). *Above*, glossy black with a brown band on wings across the median wing-coverts and innermost secondaries. *Below*, brownish black.

Female (adult). Larger than male. *Above*, including head and neck, black with a brown hind collar and light brown band on wings. *Below*, throat and foreneck greyish white (or mottled brown and white); lower neck, breast and sides white; flanks and abdomen black. 'The female is the only frigate bird with white underparts and whitish throat' (Alexander 1955).

STATUS, DISTRIBUTION and HABITAT. Rare straggler (storm-driven) in the monsoon. Breeds on Seychelles and Aldabra Islands (Indian Ocean) lying between the equator and 15°S., and 45° to 60°E.

The only Indian specimen (σ^1 , BNHS Coll.) is a storm-blown example, entangled in a fishing net in a rough sea at the onset of the SW. monsoon near Quilon (Kerala), originally misidentified as *F. andrewsi* (q.v.). But there are three independent SW. monsoon sight records from Bombay by reliable observers (Taylor, JBNHS 51: 939) and two specimens from Ceylon, both females — one in the Colombo Museum (also recorded as *F. andrewsi* but since corrected), the other from the Tweeddale Collection in the British Museum. Phillips's sight record (JBNHS 55: 203) of large all-black frigate birds in the Maldives Islands in December and January presumably also relates to this form.

HABITS, FOOD, etc. See under Family.

MUSEUM DIAGNOSIS

MEASUREMENTS

| | Wing | Bill (from feathers) | Middle toe | Tail |
|---------------------|---------|-------------------------|------------|-------------|
| $\sigma^1 \sigma^1$ | 585-603 | 116-130 | | 392-410 mm. |
| | | | 48-57 | |
| $\sigma^1 \sigma^1$ | 605-621 | 130-150 | | 395-430 mm. |
| | | | | (Baker) |

COLOURS OF BARE PARTS (in nominate *minor* of Christmas Is. etc.) Iris ($\sigma^1 \sigma^1$) dark brown; a white spot on lower lid. Eyelids: σ^1 black; σ^1 crimson or madder pink. Bill ($\sigma^1 \sigma^1$) variable slaty, steel, or blue grey, often darker or brownish at tip; usually a pinkish area at base of lower mandible in σ^1 . Intromal and throat skin: σ^1 pale scarlet, σ^1 dull crimson. Gular pouch in σ^1 light scarlet (non-breeding) to crimson-scarlet (breeding). Feet: σ^1 dark, or reddish brown with pale pinkish white soles; σ^1 flesh white (Gibson-Hill 1947).

PLATE 3

- 1 *Ardea c. rectirostris*, Grey Heron (36). 2 *Ardea a. modesta*, Large Egret (46), breeding. 3 *Egretta g. garzetta*, Little Egret (49), breeding. 4 *Ardea p. manilensis*, Purple Heron (37). 5 *Ardeola g. grayii*, Indian Pond Heron (42). 6 *Butorides striatus (concreta)*, Little Green Heron (38 RE). 7 *Bubulcus i. coromandus*, Cattle Egret (44), winter; 7a & 7b breeding. 8 *Ixobrychus f. flavicollis*, Black Bittern (58). 9 *Ixobrychus cinnamomeus*, Chestnut Bittern (56), σ^1 ; 9a σ^1 . 10 *Nycticorax n. nycticorax*, Night Heron (52).



2.



6.



7a.



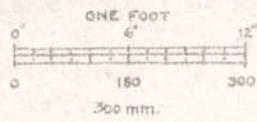
10.



8.



9.



32. Least Frigate Bird. *Fregata ariel iredalei* Mathews

Fregata ariel iredalei Mathews, 1914, Austr. Av. Rec., 2: 121 (Aldabra Island)
Baker, FBI No. 2193, Vol. 6: 298

OTHER NAME. Mascarene Frigate Bird.

SIZE. Kite +; length c. 80 cm. (32 in.).

FIELD CHARACTERS. The smallest frigate bird. ' Adults are distinguished from all other species by the conspicuous white patch on the side under the wing ' (Alexander 1955).

Male (adult). *Above*, glossy metallic black. *Below*, browner with a white patch on each side of abdomen (lower flank).

Female (adult). Larger than male. *Above*, mainly glossy black with a chestnut collar on hindneck and a brownish patch on the wing-coverts. *Below*, throat and abdomen black; breast buffy white. Young (immature). Upperparts brownish black; head, neck, breast and abdomen white streaked with rusty, the head sometimes brown (Alexander).

STATUS, DISTRIBUTION and HABITAT. Occasional straggler, doubtless often storm-blown in the monsoon. Breeds on Aldabra Island, near Madagascar, 9°30'S., 46°30'E. Reportedly also on the more northerly atolls in the Maldives c. 4°N., 72°E. (Phillips & Sims, JBNHS 55: 203, 1958). Apart from sight records there are at least six examples taken on the west coast of Ceylon, in June, July, August, September, and one near Jaffna, Northern Province, in April. A storm-driven male on 23 June (1955) near Colombo was in fresh plumage with ' testes enlarged ' (Phillips 1953, 1956).

Only two records from India: a young bird taken near Trivandrum (Kerala) in c. 1904 (Ferguson, JBNHS 16: 13) — specimen not now available — and 1 (♂) at Bombay in July 1960 (Abdulali, JBNHS 57: 668).

A young bird ringed as pullus on Aldabra I., Indian Ocean, 09°22'S., 46°28'E., 18.iv.1969, found storm-blown on Malad beach, Bombay, c. 18°55'N., 72°50'E., 4.vi.1970 — c. 4500 km NE.

GENERAL HABITS, FOOD, etc. See under Family.

MUSEUM DIAGNOSIS

MEASUREMENTS. Gibson-Hill (1950) gives for adults from Cocos-Keeling Is. (subspecies?) as follows:

| | Wing | Bill | Tarsus | Tail |
|-----|--------------------|-----------------|--------------------|------------------------|
| 4♂♂ | 518-550 (533·5) | 79-85 (82·2) | 22-23.5 (22·75) | 307-331 mm. (316·5) |
| 5♀♀ | 534-562 (547·0) | 86-93 (89·4) | 24-25.5 (24·9) | 314-324 mm. (318·4) |

A ♂ from Ceylon measures: Wing 520; bill 81; tarsus 21; tail 304 mm. (Phillips 1958); and the Bombay ♂ measures Wing 520; bill (from skull) 82; tail 325 mm. (SA).

COLOURS OF BARE PARTS. ♂ Bill grey, gular pouch red; feet black or reddish brown. ♀ Bill bluish; skin of throat red; feet red (Alexander, 1955).

Order CICONIIFORMES

Family ARDEIDAE: Herons, Egrets, Bitterns

Long-legged, lanky wading birds, from body size of village hen to vulture, with long slender flexible necks in most species. A kink in the middle (as in the Darter) enables the neck to be retracted into a flat S in flight as is characteristic of the family.

CICONIIFORMES

Bill long, straight, sharp-pointed, dagger-like. Nostrils oval, close to the base. Tarsi very long; toes long and slender, the middle and outer toes united by a small web at their base. Claw of middle toe pectinate or comb-like. Hind-toe well developed; on same plane as the other toes.



Middle toe and claw of adult

Grey Heron showing pectinations, $\times c. 1$ and loose-textured, usually white, grey, purple, or brown; in some species speckled, barred, or streaked above and/or below. Sexes alike or nearly so. In many species filamentous ornamental plumes acquired during the breeding season, for the trade in which (as 'aigrettes') the birds were greatly persecuted and in some places nearly exterminated (see Little Egret).

DISTRIBUTION and HABITAT. Throughout the tropical and temperate zones, except on some oceanic islands. Marshes, jheels, rivers, tidal estuaries.

FOOD. Fish, frogs, insects, molluscs, rodents, young birds.

BREEDING. Colonial; usually in mixed heronries of several species in association. Nests, shallow stick platforms normally on trees. Eggs, normally 3 to 6, bluish white or pale greenish blue; unmarked in Indian species. Young, nidicolous.

CLASSIFICATION. Ripley 1961: 11-19.

ANATOMICAL DETAILS. Witherby 1939, 3: 125. Stresemann 1927-1934, Aves: 810.

Key to the Indian forms

Page

| | |
|--|---|
| A Large-sized. Plumage grey above, varied below..... | 1 |
| 1 Crown and crest vinous-chestnut, neck rufous-cinnamon (length 142-152 cm. = 56-60 in.)..... | <i>Ardea goliath</i> (adult) 53 |
| Crown and neck dull rufous, foreneck streaked with black (slightly smaller than above)..... | <i>Ardea goliath</i> (juvenile) 53 |
| Crown black, crest grey-tipped (127 cm. = 50 in.)..... | <i>Ardea insignis</i> (adult) 53 |
| Crown white, occipital crest black, neck smoky white (98 cm. = 39 in.)..... | <i>Ardea cinerea</i> (adult) 54, 55 |
| Crown grey, crest black, neck grey (slightly smaller than above).... | <i>Ardea cinerea</i> (juvenile) 54, 55 |
| Crown black, neck ferruginous striped with black and buff (97 cm. = 38 in.)..... | <i>Ardea purpurea</i> (adult) 57 |
| B Large-sized. Plumage dark brown to cinnamon brown above, head and neck rufous..... | 2 |
| 2 Dark brown above, head and neck pale rufous-brown streaked with white (127 cm. = 50 in.)..... | <i>Ardea insignis</i> (juvenile) 53 |
| Head and neck rufous-brown. Lower foreneck streaked with black, rest of plumage uniform cinnamon-brown in distance as result of broad cinnamon-brown edges masking the purplish slaty feathers (97 cm. = 38 in.) | <i>Ardea purpurea</i> (juvenile) 57 |
| C Medium-sized. Plumage mainly dark slaty blue above and below.... | 3 |
| 3 Throat and breast streaked with chestnut and white (58 cm. = 23 in.)..... | <i>Ixobrychus flavicollis</i> (adult) 88 |
| Throat glistening white, bushy nuchal crest (58 cm. = 23 in.).... | <i>Egretta sacra</i> (breeding — dark phase) 77 |

| | | |
|---|---|--------|
| | Throat glistening white, crest of two long feathers (63 cm. = 25 in.) | 74 |
| | <i>Egretta gularis</i> (breeding — dark phase) | |
| D | Small- to medium-sized. Plumage mainly various shades of greenish- or bluish-black, white, and grey..... | 4 |
| 4 | Plumage generally white and grey, with greenish black crest and mantle, wings paler than back (58 cm. = 23 in.)..... | 78 |
| | <i>Nycticorax nycticorax</i> (adult) | |
| | Smaller (46 cm. = 18 in.). Plumage generally grey with greenish-black crest, mantle streaked with pale greenish grey, wings darker than back | 59-62 |
| | <i>Butorides striatus</i> (adult) | |
| E | Wings and upperparts dark sooty brown glossed with metallic green, wing-coverts spotted with white, sides of neck and underparts streaked with slaty brown..... | 5 |
| 5 | Crown and crest brown (58 cm. = 23 in.)..... | 78 |
| | <i>Nycticorax nycticorax</i> (juvenile) | |
| | Crown and crest black (46 cm. = 18 in.)..... | 59-62 |
| | <i>Butorides striatus</i> (juvenile) | |
| F | Small- to medium-sized. Wings, tail, and underparts white; head, neck, breast, and back variable..... | 6 |
| 6 | Head, neck, and breast pale ochre. Back dark rusty or maroon-brown (46 cm. = 18 in.)..... <i>Ardeola grayii</i> (breeding) | 63, 65 |
| | Head dark rusty brown, breast purplish, back deep blue-black (52 cm. = 21 in.)..... <i>Ardeola bacchus</i> (breeding) | 65 |
| | Head, neck, and breast pale ochre heavily streaked with dark brown, back pale ashy brown..... <i>Ardeola grayii</i> (non-breeding) | 63, 65 |
| | Similar to above but back darker..... <i>Ardeola bacchus</i> (non-breeding) | 65 |
| G | Medium-sized. Plumage generally light buff or rich chestnut..... | 7 |
| 7 | Top of head black, sides of head, neck, and upperparts rich chestnut-brown, back finely vermiculated with black, underparts pale buffy white streaked with black and chestnut. Under wing-coverts white barred with black, primaries black tipped with chestnut and white. Bill short and stout (51 cm. = 20 in.)..... <i>Gorsachius melanolophus</i> | 80, 82 |
| | Top of head and moustache black, rest of plumage pale yellowish buff, upperparts heavily streaked with blackish, underparts streaked with chestnut, primaries black barred with pinkish brown (71 cm. = 28 in.) | |
| | <i>Botaurus stellaris</i> | |
| H | Generally small-sized with underparts predominantly brown, buff, or chestnut | 89 |
| 8 | Colour and pattern of upperparts sharply differentiated on crown, back of neck, and mantle | a |
| | Colour and pattern of upperparts less sharply differentiated on crown, back of neck, and mantle..... | b |
| | Colour of upperparts with no sharp differentiation of crown, back of neck, or mantle..... | c |
| a | Top of head, upperparts and primaries black; large greyish buff patch on wing; underparts pale buff with dark lanceolate feathers across upper breast (36 cm. = 14 in.).... <i>Ixobrychus minutus</i> (male) | 89 |
| b | Crown black, back of neck pale chestnut, mantle dark brown (in value, almost as dark as primaries). Buffy patch on wing (36 cm. | |

| | Page |
|--|--------|
| = 14 in.) <i>Ixobrychus minutus</i> (female) | 83 |
| Crown blackish, back of neck pale buff, feathers of mantle dark brown broadly edged with pale buff, buffy patch on wing..... | |
| <i>Ixobrychus minutus</i> (juvenile) | 83 |
| Crown streaked with black and chestnut, back of neck chestnut, mantle chestnut streaked with darker brown and buff, no buffy patch on wing, chestnut streak down throat pronounced (38 cm. | |
| = 15 in.) <i>Ixobrychus sinensis</i> (juvenile) | 86 |
| Similar to above but crown darker, back of neck chestnut, mantle brown streaked with buff, wing patch buffy, streak down throat not pronounced | |
| <i>Ixobrychus sinensis</i> (female) | 86 |
| Crown, primaries, and tail black, back of neck rufous, mantle brownish buff, wing patch buffy, underparts pale buff with dark lanceolate feathers across breast..... | |
| <i>Ixobrychus sinensis</i> (male) | 86 |
| c Upperparts dark brown, underparts paler and unstreaked, middle of throat chestnut streaked with black and white, tail black (58 cm. | |
| = 23 in) <i>Ixobrychus flavicollis</i> (female) | 88 |
| Upperparts dark brown speckled with yellowish buff, underparts yellowish white with blackish streaks on throat and breast, tail brown (38 cm. = 15 in.)..... | |
| <i>Ixobrychus cinnamomeus</i> (juvenile) | 84 |
| Similar to above but paler and more chestnut..... | |
| <i>Ixobrychus cinnamomeus</i> (female) | 84 |
| Upperparts bright chestnut, underparts paler, median streak of blackish on throat and breast..... | |
| <i>Ixobrychus cinnamomeus</i> (male) | 84 |
| I Plumage pure white throughout..... | 9 |
| 9 Neither crest nor breast plumes, but lacy plumes on back..... | |
| <i>Ardea alba</i> (breeding) | 68, 69 |
| No crest but full plumes on back and breast..... | |
| <i>Egretta intermedia</i> (breeding) | 71 |
| Crest of two long feathers; full plumes on back and breast; feet parti-coloured; bill black..... | |
| <i>Egretta garzetta</i> (breeding) | 72 |
| Crest of two long feathers; full plumes on back and breast; feet parti-coloured; bill yellow..... | |
| <i>Egretta gularis</i> (breeding — light phase) | 74 |
| Crest of thick, rather hairy feathers..... | |
| <i>Egretta sacra</i> (breeding — light phase) | 77 |
| Feathers of head and neck orange-buff..... | |
| <i>Bubulcus ibis</i> (breeding) | 66 |

Genus ARDEA Linnaeus

Ardea Linnaeus, 1758, Syst. Nat., ed. 10, 1: 141. Type, by subsequent designation,
Ardea cinerea Linnaeus (Gray, 1840)

Bill long, compressed, and pointed; culmen straight, edges of both mandibles slightly serrated at commissure. Upper mandible grooved on either side; nostrils rather long, situated near base. Sides of head to behind eye naked. Tibia partially naked; tarsus long, scutellated in front. Wings ample and rounded; tail short, nearly square-cut. Head crested; lower plumage very lax and soft; feathers at base of neck below and on scapulars long and attenuated forming ornamental plumes.

Genus cosmopolitan.

33. Great Whitebellied Heron. *Ardea insignis* Hume

Ardea imperialis Baker, 1928, Bull. Brit. Orn. Cl. 49: 40 (Sikkim terai, Bhutan duars, Baker, FBI No. 2220, Vol. 6: 342
Plate 5, fig. 2, facing p. 96

LOCAL NAMES. None recorded.

SIZE. Considerably larger than Grey Heron; length c. 127 cm. (50 in.).

FIELD CHARACTERS

Adult. *Above*, like the Grey Heron (q.v.). Crown slaty black (*contra* white), the longest crest feathers tipped grey. Tail and primaries slaty black. *Below*, lower breast, abdomen, flanks, axillaries, under tail-coverts pure white. Thigh-coverts white in front, grey behind. Sexes alike.

' Except for the whitish chin and throat, and the shiny white belly, under wing- and under tail-coverts, the bird appears dull grey all over' (H. C. Smith, MS.).

STATUS, DISTRIBUTION and HABITAT. Resident, but apparently rare, in Nepal and Sikkim terai, Bihar (north of Ganges river), Bhutan duars to NE. Assam, East Pakistan, Arakan, and N. Burma where the upper reaches of the Irrawaddy river mentioned as one of its strongholds. Affects inland swamps, marshes, and stretches of rivers through forest. Not on sea coast. Singly or in small parties of four or five.

GENERAL HABITS. As of the Family. Nothing specifically recorded.

BREEDING. Unrecorded in our area; only once in Arakan, Burma (April) — a huge stick nest in a lofty tree, containing four eggs like those of Grey Heron but larger, c. 70 × 50 mm.

MUSEUM DIAGNOSIS. See A. O. Hume 1878, *Stray Feathers*, 6: 470-1.

MEASUREMENTS. A male collected by H. C. Smith in Burma had wing 530 mm. Baker gives for

| | Wing | Bill (from feathers) | Tarsus | Tail |
|-----|---------|-------------------------|---------|-------------|
| ♂ ♀ | 546-572 | 152-176 | 171-216 | 199-211 mm. |

COLOURS OF BARE PARTS. ' Iris ochraceous yellow. Bill and legs blackish' (H. C. Smith). ' Loral skin, orbital skin, and base of lower mandible greenish; upper mandible and inner margin of lower mandible blackish slaty; tip of lower mandible underneath greenish ochre, remaining portion mussel-grey. Tarsus black with horny patches. Claws black' (Stevens).

34. Giant Heron. *Ardea goliath* Cretzschmar

Ardea goliath Cretzschmar, 1826, in Rüppell's Atlas, Vögel : 39, pl. 26
(White Nile, Bahbar Abiad)
Baker, FBI No. 2221, Vol. 6: 343
Plate 5, fig. 5, facing p. 96

LOCAL NAMES. None recorded.

SIZE. Considerably larger than Grey Heron; length c. 142-152 cm. (56-60 in.). Standing almost the height of a man.

FIELD CHARACTERS. Like a gigantic Purple Heron.

* For reversion of name from *imperialis* Baker see Biswas, 1963, JBNHS 60(3): 680.

Adult. *Above*, crown and crest deep vinous chestnut; neck rufous-cinnamon. Upperparts, wings and tail slaty grey. *Below*, chin, cheeks, and throat, white; elongate breast plumes streaked white and slaty black. Lower parts, including wing-lining, deep chestnut or maroon. Sexes alike.

Young (immature). *Above*, head and neck duller and paler rufous. Upperparts grey with rufous edging. *Below*, white streaked with brown.

STATUS, DISTRIBUTION and HABITAT. Rare vagrant. Essentially an African species, breeding on islands off the African and Arabian coasts of the Red Sea, and in Iraq, etc. Appearances in India sporadic, rare, and somewhat mysterious. Blyth got some live examples in the Calcutta market in 1845 and 1846, presumably from the Salt Lakes where he shot one bird each in 1878 and 1879; a third seen in 1880. In c. 1873 Hume saw six gigantic herons on the river near Multan (W. Pakistan) above the confluence of the Chenab and Sutlej, with a great deal of rufous about the neck, which were probably this species (SF, 1: 105). Blanford observed one example each near Nagpur (Madhya Pradesh) and in Baluchistan; Stuart Baker saw five on the Meghna river near Dacca in 1910. After that no record till December 1925 when one was shot by L. R. Fawcett in the Khulna Sunderbans, now in East Pakistan (JBNHS 31: 523). Described by the collector as 'not uncommon'; Peter Jackson, 1974 (JBNHS 71(3): 608), observed several in the same locality. Two specimens collected in Ceylon, also in 1878 and 1879, and another seen on a later occasion; also a solo quite recently (T. W. Hoffmann, CBCN, Feb. 1975: 6).

GENERAL HABITS. As of the Family. In its endemic area frequents tidal creeks, mangrove swamps, estuaries, and inland lakes. Usually solitary and very shy. Has a seemingly slow and ponderous flight. Archer 1937 (1: 47) points out that for the bird's size its pale blue eggs are remarkably small (c. 71 x 52 mm.), being nearly equal to those of the Crab Plover (*Dromas ardeola*), which is one-third its size, or less, but lays large eggs.

MUSEUM DIAGNOSIS

MEASUREMENTS

| | Wing | Bill (from feathers) | Tarsus | Tail |
|-----|---------|-------------------------|---------|-------------|
| ♂♂ | 570-589 | 184-196 } | 225-252 | 212-237 mm. |
| ♀ ♀ | 592-662 | 180-196 } | | |

COLOURS OF BARE PARTS. Iris yellow, with an outer rim of red. Bill dark hornyl slate, the lower mandible, gape, and commissure paler and yellowish. Legs and feet dark slaty black (Baker).

35. European Grey Heron. *Ardea cinerea cinerea* Linnaeus

Ardea cinerea Linnaeus, 1758, Syst. Nat., ed. 10, 1: 143 (Europe, restricted to Sweden)
Baker, FBI No. 2217, Vol. 6: 339

LOCAL NAMES. As under No. 36.

SIZE. Length c. 98 cm. (39 in.) including neck and legs. Standing about 75 cm. high.

FIELD CHARACTERS. A lanky, long-legged, long-necked grey marsh bird. Indistinguishable in the field with certainty from the resident Eastern

Grey Heron (q.v.), from which it differs in being a darker grey above. Sexes alike; female smaller.

STATUS, DISTRIBUTION and HABITAT. Casual winter visitor, recorded from Baluchistan, Sind, Kutch, and Nepal (Rand & Fleming), but possibly commoner and more widespread than hitherto believed. Shows great diversity of status within a single population, some individuals (or local populations) sedentary, others — specially juveniles — tending to wander and even migrate long distances. Thus, a ringed example from Kazakhstan ($40^{\circ}48' N.$, c. $70^{\circ}E.$) USSR was recently recovered in South Kanara, Mysore (JBNHS 59: 650). Breeds in the Palaearctic and Ethiopian regions — Europe, N. Africa to Asia Minor, NW. Siberia.

MUSEUM DIAGNOSIS. See Witherby 1939, 3: 131-3.

MEASUREMENTS, COLOURS OF BARE PARTS etc. See under No. 36 below.

36. Eastern Grey Heron. *Ardea cinerea rectirostris* Gould

Ardea rectirostris Gould, 1843, Proc. Zool. Soc. London : 22 (New South Wales
‘ = India?’, Stone, 1913, Austral. Av. Rec., 1: 142 restricted by

Ripley 1961, Synopsis: 12 to India)

Ardea leucophaea Gould, 1848, Proc. Zool. Soc. London : 58 (India)

Ardea cinerea jouyi Clark, 1907, Proc. U.S. Nat. Mus., 32: 468 (Seoul, Korea)
Baker, FBI No. 2218, Vol. 6: 340

Cf. Baker, E. C. S., 1928, Bull. Brit. Orn. Cl. 49: 30-40

Abdulali, H., 1968, JBNHS 65: 191-2

Plate 3, fig. 1, facing p. 48

LOCAL NAMES. *Nāri*, *Sain*, *Kābūd*, *Āñjān* (Hindi); *Khyra* (Bihar); *Sada kānk* or *Kānk*, *Anjan* (Bengal); *Saa* (Sind); *Brīg* (Kashmir); *Natayana pachchi* (Telugu); *Nārāi*, *Sambal nārāi* (Tamil); *Chārāmūnti* (Malayalam); *Kalapua karawal koka*, *Indura koka* (Sinhala); *Kūdil* (Kolis of Maharashtra).

SIZE. Same as No. 35. Standing c. 75 cm. high.

FIELD CHARACTERS. A long-legged, long-necked marsh bird.

Male (adult). *Above*, ashy grey with white crown and neck, and long black occipital crest. *Below*, a conspicuous black-dotted line down middle of foreneck. Elongated black-streaked white feathers on breast. Rest of underparts greyish white.

Female similar but smaller, with crest and pectoral plumes less developed.

STATUS, DISTRIBUTION and HABITAT. Resident. All India, both Pakistans, Nepal, Ceylon, Maldives Islands, Andamans, and Nicobars (?). From plains level to about 900 m. in Nepal, and between c. 3500-4000 m. in Ladakh. Breeds up to c. 1750 m. — Vale of Kashmir. Affects inland water — jheels, marshes, rivers; also tidal creeks, estuaries, mangrove swamps, coastal backwaters, and rocky offshore islets.

Extrazonal. The Middle East, Burma, Thailand, Indochina, Malaysia. E. Siberia, E. China, Japan, Formosa, Hainan.

GENERAL HABITS. Usually solitary, occasionally small parties; gregarious when nesting. Largely crepuscular, hunting chiefly in the early morning twilight and into the dusk. Still-hunts by standing motionless at the water's edge head sunk between the shoulders, or wades into the shallows neck arched and partly stretched forward, peering intently for any fish or frog

that may blunder within striking range of the formidable poised bill. When prey is sighted the bird cranes its flexible neck forward and freezes, waiting for a favourable opportunity to strike. Presently the rapier bill is shot out with lightning speed and the unsuspecting victim impaled or firmly secured in the mandibles. With an upward jerk it is manoeuvred into position and swallowed head foremost. Sometimes the bird will stalk its prey stealthily or shift to a new vantage point, lifting up and putting down each foot noiselessly and with studied deliberation. Single birds observed perched all day long on snags—the remnants of submerged forest trees under the waterspread of dammed irrigation reservoirs (e.g. Periyar Lake in Kerala), almost flush with the surface. They procure their food in such deep water by jabbing at prey as it swims or floats past or by short forays from the base, bellyflopping momentarily on the surface to seize a fish. When disturbed, the bird rises with a harsh *quaark* which is also uttered from time to time on the wing. The initial take-off from the perch is clumsy and accompanied by an awkward stretching of the long neck, vigorous laboured flapping of the wings, and by much swaying and balancing with the long loosely dangling legs. The launching is preceded by a slow swinging, or waggling, of the tail up and down, as if to assist in the process. The bird then flexes its legs and springs upward. Once in the air it flies strongly with steady flaps of the broad wings, neck characteristically folded back in a flat S, head drawn in between the shoulders, legs tucked under the tail and trailing behind. It roosts at night on trees and mangroves, and also settles on them in daytime when sated.

FOOD. Fish, frogs, molluscs, crustaceans, aquatic insects, small rodents, and young birds. In Kashmir alleged to do considerable damage to the trout fisheries. However, a proper scientific investigation of the food and feeding habits may reveal, as elsewhere, that by preying largely on predatory fishes the birds actually do more good than harm to the trout. Drinks water in the usual manner of birds, repeatedly dipping bill into the liquid and raising head to swallow.

VOICE and CALLS. In addition to the resonant *quaark* uttered in flight, a variety of harsh croaks and, at the heronry, a goose-like honk.

BREEDING. *Season.* Various. Mainly March to June in Kashmir; July to October in northern India; November to March in S. India and Ceylon. Nests gregariously, sometimes in pure colonies but usually in mixed heronries of egrets, storks, cormorants, night herons, etc. Two best-known of such heronries are Keoladeo Ghana in Rajasthan, and Vedanthangal in Madras, but smaller and less-known ones widely scattered over the country. In Kashmir Valley the largest chenar trees (*Platanus orientalis*), often over 35 m., are selected for the nests; in Keoladeo Ghana large *keli-kadamb* (*Stephogyne parviflora*), and babool (*Acacia arabica*) and kandi (*Prosopis spicigera*) are the most favoured, while at Vedanthangal the substrate is provided by partially submerged *Barringtonia racemosa* trees. The selected trees are usually standing in water or in its close proximity. In tidal forest nests are normally built on mangroves, *Avicennia*, *Rhizophora*, and other species. Rarely tall dense reed-beds are used. *Nest*, a platform of twigs with a central depression scantily lined with leaves, straw, and water-weeds. Often many nests in a single tree, cheek by jowl with those of other tenants of the heronry. *Eggs*,

normally 3 or 4 occasionally 5, broad to moderately long ovals, pale sea green or green-blue, variable in shade. Average size of 100 eggs $58 \cdot 6 \times 43 \cdot 5$ mm. (Baker).

Both sexes share in building the nest, incubation, and feeding the young. Incubation period 25–26 days. Incubation, as with most other occupants of heronries, begins with the first egg as a protection from the fierce sun and from nest-robbers like crows. Thus a marked disparity is noticeable among chicks of the same brood. Chick in down grey above whitish below; the down on the crown very long and erect with bristly tips giving a crested appearance. Young fed by regurgitation. On arrival of parent at nest its bill is seized by an importunate youngster in its own mandibles and vigorously twisted and wrestled with till the parent disgorges the half digested food. This either taken by small chicks directly from parent's bill or gobbled up from nest floor when older.

For details of courtship, nest relief and other behaviour see Witherby 1939, 3: 126–9.

MUSEUM DIAGNOSIS. For plumages of nominate race, from which *rectirostris* differs only in minor details, see *ibid.*: 131–3.

MEASUREMENTS. Baker gives for Indian and Chinese examples of *rectirostris*:

| | Wing | Bill (from feathers) | Tarsus | Tail |
|-----|------------|-------------------------|---------|-------------|
| ♂ ♀ | 422–475 | 109–135 | 140–162 | 165–180 mm. |
| | (once 481) | | | |

There is no significant difference in size between the two races.

Weight 4 oo? 1500–2250 (av. 1757) gm. BNHS

COLOURS OF BARE PARTS. Iris golden yellow. Bill (breeding) bright orange-yellow with a brown line down middle of culmen; (non-breeding) dark horny brown. Legs and feet (breeding) bright orange-yellow sometimes with a pink tinge; (non-breeding) greenish brown, marked with yellowish on the joints and back of tarsi (SA).

MISCELLANEOUS. Longevity, *A. c. cinerea* (from ringing data) = 24 + years (*Ring*, 1962, 33: 148).

37. Eastern Purple Heron. *Ardea purpurea manilensis* Meyen

Ardea purpurea var. *manilensis* Meyen, 1834, Nova Acta Acad. Caes. Leop. Carol. 16,
suppl.: 102–103 (Philippines)

Baker, FBI No. 2216, Vol. 6: 337

Plate 3, fig. 4, facing p. 48

LOCAL NAMES. *Nāri*, *Lāl sain*, *Lāl īnjān* (Hindi); *Khyra* (Bihar); *Lāl kānk* (Bengal); *Lāl kol* (Assam); *Yerra nārāyānā pākshi* (Telugu); *Chēnnārai* (Tamil); *Chāyāmūnti* (Malayalam); *Karawala kokka*, *Barendi kokka* (Sinhala).

SIZE. Smaller and slighter than Grey Heron; length c. 97 cm. (38 in.) including long neck and legs. Standing c. 70 cm. high.

FIELD CHARACTERS. A lanky marsh bird like the last. In direct sunlight upperparts, including dorsal surface of wings, bright purple, a shade darker than the Purple Moorhen.

Adult. *Above*, purplish blue or purplish slaty; blackish on wing and tail. Crown and crest slaty black, rest of head and long thin neck ferruginous boldly striped with black. *Below*, chin and throat white; long drooping plumes on upper breast buffy white with black and chestnut streaks. Rest of

CICONIIFORMES

underparts slaty black and rich chestnut; under wing chiefly ferruginous. Sexes alike; female with crest and pectoral plumes less developed.

Young (immature). Uniform cinnamon brown in distance, effect of broad cinnamon-brown edges masking the purplish slaty feathers.

STATUS, DISTRIBUTION and HABITAT. Resident and local migrant. Throughout the plains of India east to Assam and Manipur, both Pakistans, Nepal (lowlands), Ceylon, Andamans and Nicobars. Possibly as in Grey Heron, augmented in winter by influx of extralimital migrants. The nominate race, with more black streaks on foreneck, has been obtained by Meinertzhagen (JBNHS 32:91) in Baluchistan (Quetta, Nushki), where it occurs sporadically (Christison, ibid. 43:486). Frequents jheels, reedy swamps, lakes, and rivers.

Extralimital. Burma, Thailand, the Indochinese countries, China south of the Yangtze and Ryukyu Islands, south to the Philippines, Greater Sunda Island and Celebes (Sulawesi). Other races in Europe, Madagascar, and Ussuriland.

GENERAL HABITS. Largely crepuscular. Solitary. Similar to those of Eastern Grey Heron (q.v.). Perhaps shyer and more secretive, keeping to dense reed cover, where it may be easily overlooked on account of the bittern-like way it freezes on suspicion — thin neck and bill upstretched — camouflaging it among the reeds. The bird flushes out with a flutter and harsh croaking when suddenly come upon, and settles on a low tree in the open until the covert is quiet again.

FOOD AND VOICE. Similar to the Grey Heron.

BREEDING. *Season.* Various; June to September-October in N. India; November to March in S. India and Ceylon. Usually nests in small colonies of its own. When in mixed heronies with other species, shows a tendency to segregation into its own *mohallas*. *Nest*, a platform of sticks and branches, or rush stems, built in trees, dense reed beds, or screw pine (*Pandanus*) tangles standing in fairly deep water, from a few centimetres to two or three metres above the surface. The rushes or *Pandanus* leaves are beaten down to form a platform for the nest. *Eggs*, 3 to 5, rarely 6, pale sea green or greenish blue. Broad to moderately long ovals, close and smooth textured; very similar to eggs of Grey Heron. Average size of 100 eggs 54.6 × 39.7 mm. (Baker). Both sexes share nest-building, incubation, and care of the young. Incubation period about 24–26 days. Eggs laid at longer intervals than 24 hours; incubation commences from the first egg, hence the very marked disparity in young of the same brood. Half-grown chicks clamber about freely among branches of nest-tree, but promptly return to nest on arrival of foraging parent. The parent's bill is seized and violently stroked and drawn down to induce regurgitation. The food is gobbled up from the nest floor, or as it issues from the parent's throat.

MUSEUM DIAGNOSIS. For plumages of nominate race, from which *manilensis* differs only in details and is hardly distinguishable, see Witherby 1939, 3 : 136–7.

MEASUREMENTS

| | Wing | Bill (from feathers) | Tarsus | Tail |
|-----|---------|-------------------------|---------|------------------------|
| ♂ ♀ | 327–387 | 115–144 | 121–145 | 120–142 mm. (Baker) |

Males are appreciably larger than females.

COLOURS OF BARE PARTS. Iris yellow; orbital skin dull greenish or yellowish green. Bill dark yellow, culmen and tip horny brown. Legs and feet reddish brown, soles and hinder edge of tarsus paler and more yellow. In breeding birds bill and legs much brighter orangy.

MISCELLANEOUS. Both this and Grey Heron highly prized as food by certain classes, e.g. the mohanas or inland fishermen of Sind. The birds are kept tethered by a leg, perched on floating bits of log or on the prow of the mohanas' houseboats to fatten for slaughter or use as decoys.

Longevity, *A. p. purpurea*: 16 + years (*Ring*, 1962, 33: 148).

37a. **Western Purple Heron.** *Ardea purpurea purpurea* Linnaeus. See Appendix. The genus *Ardea* also includes Nos. 45 and 46.

Genus BUTORIDES Blyth

Butorides Blyth, 1852(1849), Cat. Bds. Mus. Asiat. Soc.: 281. Type, by monotypy, *Ardea javanica* Horsfield

Unlike Pond Heron (*Ardeola*) has no nuptial plumage. Tibia feathered nearly to the joint. Tarsus comparatively much shorter than in *Egretta* or *Ardeola*. Feet smaller and slenderer; middle toe with claw about equal to tarsus in length, but much shorter than bill. Head crested. Scapulars and interscapulars long and lanceolate but not disintegrated as in *Egretta* or *Ardeola*. Tail of twelve feathers as in *Ardeola*.

38. Little Green Heron. *Butorides striatus javanicus* (Horsfield)¹

Ardea chloriceps 'Hodges.' = Bonaparte, 1857, Conspl. Gen. Av., 2: 129 Nepal. (Restricted to Hitaura, Chisapani Garhi dist. by Biswas, 1959, Curr. Sci., 28: 288)

Baker, FBI No. 2231, Vol 6: 357

Plate 3, fig. 6, facing p. 48

LOCAL NAMES. *Kancha bāglā* (Hindi); *Kāna bāk* or *Kuro bāk* (Bengal); *Kona moochree* (Assam); *Dosi konga* (Telugu); *Doshi kokku* (Tamil); *Podi kokka* (Sinhala); *Chinna kokku* (Malayalam).

SIZE. Pond Heron; length c. 46 cm. (18 in.).

FIELD CHARACTERS. Smaller than Pond Heron, chiefly black, grey, and metallic dark green, but otherwise like it in general effect.

Adult. *Above*, forehead, crown, and long occipital crest glossy greenish black; cheeks white; head and neck grey. Upperparts, with lengthened scapulars, slaty grey glossed with dark green and bronze-green. Wing-coverts dark glossy green. Wing quills green-glossed black, with grey and white tips and edges. *Below*, chin and centre of throat white. Lower parts ashy grey; under tail-coverts white with blackish tips or edges. Sexes alike.

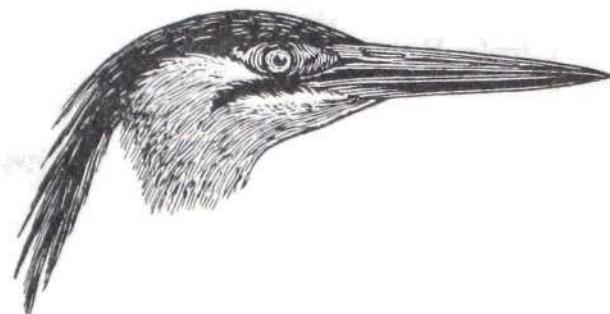
Young (immature). *Above*, brownish without the lengthened scapulars. Crown and short crest streaked with buff. Wing feathers edged with buff, and with apical white spots. *Below*, buffy white, heavily streaked with dark brown.

STATUS, DISTRIBUTION and HABITAT. Resident. Generally, but thinly distributed throughout the subcontinent from Sind (in W. Pakistan) to eastern Assam and Manipur. Also Ceylon and Laccadive Islands. Chiefly

¹ Revival of name *chloriceps* (Bonaparte) as in the earlier edition is unnecessary. See Ripley, S. D., 1969, *Ibis* 111: 102.

plains and up to at least c. 1000 m. in the Nepal bhabar and duns, and up to c. 1500 m. in the peninsular hills (Mahableshwar). Affects streams, lakes, ponds, etc., with dense marginal shrubby growth. Also coastal backwaters, mangrove swamps, and tidal creeks.

Extralimital. Burma, Thailand, Malaysia, Indochina, Indonesia, Philippines, Sunda Islands, Celebes (Sulawesi). Numerous other races occur in S. America, Africa, Indian Ocean islands, and eastern Asia south to Australia and S. Pacific islands.



× c. ½

GENERAL HABITS. Solitary; shy and retiring; silent. Crepuscular and nocturnal, but also active during daytime, particularly in cloudy overcast weather. Partial to shady nullahs and secluded rock pools in jungle streams bordered or overgrown with jamun (*Eugenia jambolana*) seedlings, *Phyllanthus lawii*, and similar bushes. Flushes when suddenly come upon, flying with deliberate wing flaps, the thick and heavy-looking neck stretched forward (not telescoped like heron's), and dropping into the shrubbery or alighting on an overhanging branch a hundred metres or so farther. Normally keeps during daytime to shady watercourses under the welter of tangled brushwood, uprooted trees and other debris brought down by monsoon torrents, perched rather sluggishly on some snag or projecting root a few inches above water, constantly flicking its tail up and down like a kingfisher. Very parochial; occupies the same secluded spot day after day. Here sits patiently craning down its neck now and again to jab at anything eatable that floats or swims past. Or it stealthily creeps along the water's edge and lunges at prey within range. On suspicion, surreptitiously clammers up into the seclusion of a thicket, descending immediately it is reassured.

FOOD. Fish, shrimps, frogs, crabs, water beetles, etc. Mudfish or *neota* (*Periophthalmus*) and *Belone strongylura* (16·50 – 20·25 cm. long) specifically recorded among stomach contents of specimens.

VOICE. Normally very silent. When flushed and flying off utters an alarm note *K'you*, *K'you* or *K'yek*, *K'yek* (y as in 'yes') (G. M. Henry). 'Tewn-tewn-tewn like redshank' (H. Abdulali). Other notes not described.

BREEDING. Evidently double brooded. Season, over the greater part of the subcontinent March to September, varying locally with water conditions; in Ceylon March to July. Nest, a small platform of twigs with an unlined depression for the eggs. Built singly, not colonially or in mixed

heronries, though exceptionally several nests may be found in a circumscribed area. Normally 3 to 4·5 metres up in a small tree in a mangrove swamp, or in one concealed among bushes on the edge of the stream or pond; occasionally near a village, the bird's silent and secretive behaviour preventing discovery. Eggs, 3 to 5, smooth, fine textured, light sea green, very like those of Pond Heron (q.v.) but curiously enough averaging larger. Average size of 40 eggs $39\cdot5 \times 29\cdot7$ mm. (Baker).

Both sexes incubate and feed the young by regurgitation, the chicks seizing the adult's bill and vigorously twisting and stroking it to make it disgorge (cf. Purple Heron). Incubation period unrecorded. Courtship display and behaviour undescribed. Incubation commences with first egg, resulting in considerable disparity in growth of nestlings in the same brood.

MUSEUM DIAGNOSIS. Indian birds, *chloriceps*, are paler than those from W. Java (*javanicus*), with longer moustachial streaks and longer wings. Wing 18 ♂♂ 174-184; 6 ♀♀ 177-182 mm. v. 3 ♂♂ 165-174; 2 ♀♀ 166-174 mm. in *javanicus* (Biswas, loc. cit.).

MEASUREMENTS

| | Wing | Bill (from feathers) | Tarsus | Tail |
|----|---------|-------------------------|--------|----------------------|
| ♂♀ | 174-203 | 56-70 | 47-51 | 54-69 mm. (Baker) |

Weight 1 ♂ 220 gm. (BNHS).

COLOURS OF BARE PARTS. Iris bright lemon-yellow. Bill, upper mandible dark horny brown, lower sage green; blacker in breeding birds. Eyelids and bare patch in front of eyes bright yellowish leaf-green. Legs and feet yellowish leaf-green, yellower on hind tarsus and soles; claws dusky.

39. Andaman Little Green Heron. *Butorides striatus spodiogaster* Sharpe

Butorides spodiogaster Sharpe, 1894, Bull. Brit. Orn. Cl., 3: xvii
(Andamans and Nicobars)
Baker, FBI No. 2232, Vol. 6: 359

LOCAL NAMES. Unrecorded.

SIZE. As last.

FIELD CHARACTERS. Similar to *chloriceps* but darker, especially on the underparts. (See Museum Diagnosis.)

STATUS, DISTRIBUTION and HABITAT. Resident. Andaman and Nicobar islands. Affects mangrove forest along the shores.

GENERAL HABITS, FOOD, VOICE, etc. As in the last.

BREEDING. No difference except that the nesting sites are chiefly in mangrove trees in tidal swamps. Eggs averaging slightly smaller — $38\cdot2 \times 28\cdot2$ mm. (Baker).

MUSEUM DIAGNOSIS. Differs from *chloriceps* in being darker grey, especially on neck, breast, and abdomen which are dark slaty grey. Sides of the head deeper grey with less white.

MEASUREMENTS. Slightly smaller:

| | Wing | Bill | Tarsus | Tail |
|----|---------|-------|--------|-----------|
| ♂♀ | 167-171 | 57-60 | 41-44 | 58-62 mm. |

COLOURS OF BARE PARTS. As in last.

40. **Paler Maldivian Green Heron.** *Butorides striatus didii* Phillips & Sims

Butorides striatus didii Phillips & Sims, 1958, Bull. Brit. Orn. Cl., 78: 51 (Malé Island, North Malé Atoll, Maldives archipelago)

Not in Baker, FBI

LOCAL NAME. *Rabonde* (Maldives).

SIZE. As *B. s. chloriceps*.

FIELD CHARACTERS. Similar to *chloriceps* but much paler even than the next form.

STATUS, DISTRIBUTION and HABITAT. Resident. Common in the central and northern atolls of the Maldives archipelago. Affects mangrove swamps and the neighbourhood of beaches.

GENERAL HABITS. Not different from *chloriceps*. At ebb tide sits on the knobs of coral on the beaches, darting out at small fishes and crabs nearby. Flies inland as tide rises to perch on tops of palm trees or stand on the sea walls and exposed coral outcrops, apparently asleep. Not shy.

41. **Darker Maldivian Green Heron.** *Butorides striatus albidulus* Bangs

Butorides albidulus Bangs, 1913, Proc. Biol. Soc. Washington, 26: 93 (Suadiva Atoll, Maldives Islands)

Not in Baker, FBI

LOCAL NAMES. *Rabonde* or *Rabulli* (Maldives).

SIZE. As *B. s. chloriceps*.

FIELD CHARACTERS. Similar to *chloriceps* but paler.

STATUS, DISTRIBUTION and HABITAT. Resident. Southern Maldives Islands. Mangrove swamps and around beaches.

GENERAL HABITS. As in the paler Maldivian race (q.v.).

MUSEUM DIAGNOSIS. Paler than *chloriceps*. Described from the unique type collected on Suadiva Atoll. Whether both races from within this group of islands can be maintained needs investigating.

MEASUREMENTS and COLOURS OF BARE PARTS. As in the other races.

Genus ARDEOLA Boie

Ardeola Boie, 1822, Isis von Oken, col. 559. Type, by monotypy, *Ardearalloides* Scopoli

Cf. Bock, W. J., 1956, Amer. Mus. Novit. No. 1779: 35-57

Feathers of head, neck and upper breast elongate. Those of the two latter decomposed during the breeding season, when also a crest of elongate, lanceolate feathers develops. Bill stout and about equal in length to middle toe and claw. Tarsus strong, about same length as bill. Tail of twelve feathers, typically broad. Neck shorter than in *Ardea*. Head, neck and back always coloured, but undergoing a complete change of colour in the breeding season.

42. Indian Pond Heron or Paddybird. *Ardeola grayii grayii* (Sykes)

Ardea Grayii Sykes, 1832, Proc. Zool. Soc. London: 158 (Dukhun)

Baker, FBI No. 2229, Vol. 6: 354

Plate 3, fig. 5, facing p. 48

LOCAL NAMES. *Bäglä, Andhā bæglä, Chama bæglä, Khunch bæglä* (Hindi); *Konch bæk* (Bengal); *Bögli* (Mirshikars, Bihar); *Ral puchake* (Gond); *Küläthū kokkū, Kürüthū kokkū, Müddai kätän, Müddyän* (Tamil); *Guddi konga* (Telugu); *Kana kokka, Podi kokka* (Sinhala); *Brökü* (Kashmir); *Külämünti* (Malayalam).

SIZE. Country hen +; length c. 46 cm. (18 in.).

FIELD CHARACTERS. An egret-like waterside bird largely snow-white and prominent when in flight, effectively camouflaged earthy brown when at rest.

Adult (non-breeding). Drab. *Above*, head and neck dark brown streaked with yellowish buff. Back, scapulars, and tertaries, ashy brown with pale yellowish shaft-stripes on the scapulars. *Below*, chin and throat white; upper breast white, streaked with brown. Rest of plumage, including tail, white.

Adult (breeding). Very handsome. *Above*, head and neck light yellowish brown; crown browner. Long recumbent white or buff occipital crest of lanceolate plumes. Back deep maroon with very long decomposed feathers extending over the tail. *Below*, chin and throat white; upper breast ashy brown, the feathers long and somewhat disintegrated. Rest of body, wings, and tail white; tips of first primaries tinged brownish. Sexes alike in breeding and non-breeding plumages.

STATUS, DISTRIBUTION and HABITAT. Resident; shifting locally with drought and flood conditions. Throughout the subcontinent, and Ceylon. Also Andaman, Nicobar, and Laccadive islands. In the plains and seaboard; up to c. 1200 m. in the peninsular hills (to 2150 m. in the Nilgiris), and c. 1500 m. in the Kashmir and Nepal valleys. Affects streams, jheels, marshes, inundated paddyfields, village tanks, stagnant roadside ditches, borrow-pits and puddles, even kutcha wells, and tidal mudflats.

Extralimital. From the Persian Gulf to Burma and Malaysia.

GENERAL HABITS. Usually solitary when feeding, or in small loose parties. Gregarious at roost; colonial when nesting. Its method of hunting is typically heron-like, either standing hunched up and motionless but fully alert on the water's edge or amidst a squelchy puddle, or stalking stealthily, lifting each foot clear of the water and putting it down circumspectly, neck craned forward and bill poised in readiness to jab at the quarry. Observed catching fish by bellyflopping on the water from overhanging stone slab c. 1 metre above (Muir, JBNHS 24: 366). Large numbers collect at drying-up village ponds after the monsoon to feast on the concentrating refugee frogs and fish. Rises with a flash of the white wings and flies with deliberate rather lazy flapping, neck partly extended as in the Little Green Heron, not folded back as in the Grey Heron.

FOOD. Frogs, fish, crustaceans, water beetles, and other insects. Mud-skippers or *neota* (*Periophthalmodon*) from tidal swamps, and *Ocypoda* crabs from between tidemarks on the sandy seashore specifically recorded. Also among insect food the following identified: *Brachytrypes achatinus*, *Atractomorpha crenulata*, *Oxya* sp., *Crocothemis servilia*, *Pelagonus marginatus*, *Trithemis*

CICONIIFORMES

pallidinervis, *Platygomphus dolobratus*, *Dysticus* spp., *Chrotogonus* spp., grasshoppers, dragonfly larvae, crickets, ants, etc.

VOICE and CALLS. A harsh croak when suddenly flushed. Birds in a nesting colony constantly utter a conversational *wa-koo* — very human-like — interlarded with short croaks.

BREEDING. Usually in small groups of its own species, or mixed with night herons, egrets, cormorants, etc. Perhaps less colonial than many others of the family. *Season*, in most parts of the subcontinent May to September; in south India and Ceylon November to February; in Ceylon till August. *Nest*, an untidy structure of twigs, slightly more substantial than a dove's nest. Built in isolated large trees or clumps such as of tamarind or mango, often growing in the midst of a noisy town or village, and not necessarily close to water. Colonies also sited in willows, as in Kashmir, or in babool (*Acacia arabica*) or tamarisk (*Tamarix* sp.) standing in water, the nests between two and four metres above the surface; likewise in mangroves. If undisturbed, the same sites are used year after year and tend to become traditional. *Eggs*, 3 to 5; smooth, fine-textured, typical broad ovals of the family, pale sea green in colour. Average size of one hundred eggs 38.0 × 28.5 mm. (Baker). Believed to pair for life, but this not proven. Both sexes take part in nest building; apparently the male chiefly responsible for collecting the material which the female puts together. Both sexes incubate and feed the young. Period of incubation 24 days (Lamba, *Pavo* 1(1)-1963). Feeding done by regurgitation as in the Grey and Green Herons (qq.v.), with vigorous bill-seizing and demands by the young.

MUSEUM DIAGNOSIS

MEASUREMENTS

| | Wing | Bill (from feathers) | Tarsus | Tail |
|-----|---------|-------------------------|--------|----------------------|
| ♂ ♀ | 199-230 | 60-67 | 60-64 | 73-84 mm. (Baker) |

Scheer (loc. cit. *infra*) gives for Indian birds:

| | Wing | Bill length | Tarsus depth at base | |
|-----|--------------------|-----------------|-------------------------|---------------------|
| ♂ ♂ | 194-230 (210.9) | 48-66 (60.6) | 12-15 (13.8) | 50-63 mm. (56.6) |
| ♀ ♀ | 182-224 (198.4) | 51-66 (58.8) | 11-15 (12.9) | 49-62 mm. (54.5) |

Weight 10 ♂ ♀ 175-310 (av. 215) gm. (BNHS).

COLOURS OF BARE PARTS. 'Iris lemon yellow. Orbital skin greenish yellow. Bill greenish yellow with blue on base, horny on middle part of culmen, black on top and sides of anterior third. Legs and feet dull green; claws pale horny; pads dingy yellowish white' (Biswas).

PLATE 4

- 1 *Sarkidiornis m. melanotos*, Nakta (115) ♂. 2 *Cairina scutulata*, Whitewinged Wood Duck (116). 3 *Nettapus c. coromandelianus*, Cotton Teal (114), ♂, breeding; 3a ♂ winter. 4 *Anser a. rubirostris*, Greylag Goose (81). 5 *Dendrocygna javanica*, Lesser Whistling Teal (88). 6 *Anser indicus*, Barheaded Goose (82). 7 *Tadorna ferruginea*, Brahminy Duck (90), ♂. 8 *Dendrocygna bicolor*, Large Whistling Teal (89). 9 *Anas platyrhynchos*, Mallard (100), ♂, breeding. 10 *Anas p. poecilorhynchos*, Spotbill Duck (97).



JPlrani

In full breeding dress the legs and feet in *some* individuals become bright salmon pink. In the majority there is merely a brightening of the yellow.

42a. Maldivian Pond Heron. *Ardeola grayii phillipsi* Scheer

Ardeola grayii phillipsi Scheer, 1960, Senck. biol. Frankfurt am Main, 41: 145

(Hitadu, Addu Atoll, Maldives)

Not in Baker, FBI

LOCAL NAME. *Hudu rabulli* (Maldivian).

SIZE. Same as 42.

FIELD CHARACTERS. Same as for 42. See Museum Diagnosis.

STATUS, DISTRIBUTION and HABITAT. Race peculiar to the Maldives. Found on the southernmost atolls — Addu and Suadiva. Affects freshwater ponds and rain puddles; also tidal mudflats.

GENERAL HABITS, FOOD, VOICE and CALLS. Similar to 42. Recorded as eating frogs, skinks, small fish, shrimps and insects. Has been observed jabbing at large land crabs with the heavy bill.

BREEDING. No information.

MUSEUM DIAGNOSIS. Differs from the nominate form in having a more massive bill in the male, and shorter tarsus in the female. Outermost primaries in adult pure white instead of dusky.

MEASUREMENTS

| | Wing | Bill | Tarsus | |
|-----|--------------------|-----------------|-------------------|---------------------|
| | length | depth at base | | |
| ♂ ♂ | 207-220 (211·1) | 64-68 (65·8) | 14·5-16 (15) | 54-67 mm. (57·6) |
| ♀ ♀ | 186-199 (190·6) | 53-58 (56·5) | 12·5-14 (13·1) | 49-52 mm. (50·1) |

COLOURS OF BARE PARTS. 'Iris golden yellow. Bill yellow. Legs pale yellow-green becoming deeper yellow in ♂ ♂ and more rose in ♀ ♀ during the breeding season. Weight of type specimen 230 gm.' (Scheer).

43. Chinese Pond Heron. *Ardeola bacchus* (Bonaparte)

Buphus bacchus Bonaparte, 1855, Conspl. Av., 2(1) (Malay Peninsula)

Baker, FBI, No. 2230, Vol. 6: 355

LOCAL NAMES. *Lampra* (Manipur).

SIZE. Indian Pond Heron +; length c. 52 cm. (21 in.).

FIELD CHARACTERS. Slightly larger than Indian Pond Heron and very similar to it in non-breeding plumage.

Adult (breeding). *Above*, head and neck, with long lanceolate nuchal crest, dark maroon-chestnut. Back and some scapulars blackish slaty. *Below*, chin and throat white; elongate breast plumes dark maroon-chestnut, blackish towards ends. Rest of body including wings and tail white; the outer two or three primaries brownish at tip. Sexes alike.

egrets have favourite roost trees, shared with crows, mynas, and other birds, to which they resort every evening flying in a more or less disorderly rabble in the characteristic heron style — neck folded back, head hunched between the shoulders, and legs tucked under the tail, projecting behind like a rudder.

FOOD. Chiefly insects. From stomach contents the following have been identified: Sarcophagidae, *Agrotis* sp. larvae, *Chrotogonus* spp., *Acridium aeruginosum* and other grasshoppers, carabid beetles, earth-worms, and flies (Muscidae). To a minor extent tadpoles, frogs and lizards.

VOICE and CALLS. A low croak uttered when one bird is supplanting another, especially at nest colony. Normally very silent.

BREEDING. Season, mainly June to August in N. India; November to February in the south; February to July in Ceylon. In small to medium sized colonies of its own, but more usually mixed with cormorants, night herons, egrets, etc., in large trees such as mango, tamarind, or peepul, often standing in the midst of a noisy bazaar — even within populous cities like Bombay, Madras, and Calcutta — not necessarily close to water. Eggs, 3 to 5, broad ovals, very pale sea green, almost white or skim-milk blue. Average size of 80 eggs 44.1×36.5 mm. (Baker). Both sexes share in nest building, incubation, and feeding the young by regurgitation as in Purple Heron (q.v.). Incubation period undetermined.

MUSEUM DIAGNOSIS

MEASUREMENTS

| | Wing | Bill (from feathers) | Tarsus | Tail |
|-----|---------|-------------------------|--------|-----------|
| ♂ ♀ | 240-260 | 50-66 | 82-92 | 83-96 mm. |

Males average a little larger than females.

Weight 2 oo? 450, 475 gm. (BNHS).

COLOURS OF BARE PARTS. Iris golden yellow. Bill yellow; orbital and facial skin greenish yellow. Legs and feet black, the upper parts of the tibia, and soles, yellow or greenish yellow (Baker).

Genus EGRETTA Forster

Egretta T. Forster, 1817, Syn. Cat. Brit. Bds.: 59. Type, by monotypy, *Ardea garettæ* Linnaeus

Contains those egrets which in the breeding season develop ornamental plumes on the back as well as, in some cases, on the breast and head. All are white at all seasons with the exception of *E. gularis* and *E. sacra* which are dimorphic with also slaty phase. Smaller than birds of the genus *Ardea* and with much slenderer bills and thinner necks. In winter plumage the species can be distinguished chiefly by size.

See Key, p. 50.

45. Large Egret or Great White Heron. *Ardea alba alba* Linnaeus

Ardea alba Linnaeus, 1758, Syst. Nat., ed. 10, 1: 144 (in *Europa* = Sweden)

Baker, FBI No. 2222, Vol. 6: 345

LOCAL NAMES. Same as next.

SIZE. Grey Heron ±; length c. 96 cm. (38 in.); standing c. 75 cm. to top of head.

FIELD CHARACTERS. A large lanky snow-white heron-like marsh bird with bare blackish legs, long slender neck and head, and pointed black-and-yellow or yellow bill. In the breeding season a bunch of ornamental filamentous plumes (aigrettes) develops on the back, falling over beyond the tail. Sexes alike. Solitary.

STATUS, DISTRIBUTION and HABITAT. Rare winter straggler into West Pakistan and Uttar Pradesh. Affects jheels and marshes.

Extralimital. Breeds in SE. Europe, W. and N. Asia to SE. Siberia, N. China, N. Japan.

GENERAL HABITS. See next.

MUSEUM DIAGNOSIS. For plumages etc. see Witherby 1939, 3: 139.

MEASUREMENTS

| | Wing | Bill (from feathers) | Tarsus | Tail |
|-----|---------|-------------------------|---------|-------------|
| ♂ ♂ | 410-465 | 110-135 | 170-215 | 140-185 mm. |
| ♀ ♀ | 400-450 | 110-132 | — | — |

COLOURS OF BARE PARTS. Iris yellow. Bill black, base yellow (ad. summer), all yellow (ad. winter & juv.); lores and round eyes green; legs and feet black-brown, sides yellowish, toes greenish black (Witherby).

46. Eastern Large Egret. *Ardea alba modesta* J. E. Gray

Ardea modesta J. E. Gray, 1831, Zool. Misc.: 19 (India)

Baker, FBI No. 2223, Vol. 6: 346

Plate 3, fig. 2, facing p. 48

LOCAL NAMES. *Mäläng bágla*, *Túrra bágla* (?), *Tar bágla*, *Bädä bágla* (Hindi); *Dhär bák*, *Bädä bák* (Bengal); *Bör bög* (Assamese in Nowgong); *Loklenba* (= 'standing in streams' — Manipur); *Peddä tellä konga* (Telugu); *Mala konga* (Gond); *Peria vellai kokku* (Tamil, Ceylon); *Loku sudu kokka*, *Badadel kokka* (Sinhala); *Báglo áchho* (Sind); *Perümünti* (Malayalam).

SIZE. Grey Heron —; length c. 91 cm. (36 in.).

FIELD CHARACTERS. Slightly smaller, otherwise identical with the foregoing and indistinguishable from it. Size variable and deceptive; thus in non-breeding plumage confusion between some individuals and the Smaller Egret easily possible. In breeding season, especially during various nest ceremonies, the diaphanous lacelike plumes of the back are often erected and spread out in 'showers' — a halo of mist! No crest. Sexes alike.

STATUS, DISTRIBUTION and HABITAT. Resident and nomadic, shifting locally with water conditions. Throughout the subcontinent and Ceylon. Nepal Valley (?) and lowlands, and Maldive Islands in winter. Not recorded in Andaman or Laccadive is.; possible sight record in Nicobars (JBNHS 61: 502). Low country — at jheels and marshes, rivers, tidal estuaries, etc.

Extralimital. Burma, eastward through the Indochinese countries and Malaysia to S. and C. China, S. and C. Japan, south and east to Australia.

GENERAL HABITS. Usually solitary, and seldom more than two or three separated individuals amongst feeding groups of the two smaller species. More gregarious when nesting, but everywhere less abundant, more widely scattered, and less communal than the other egrets. Behaviour and feeding

STATUS, DISTRIBUTION and HABITAT. Resident; shifting locally. Eastern Assam, Manipur, East Pakistan, Andaman islands. Affects marshes, and every sort of inland and tidal waters, as the Indian bird (q.v.).



Winter plumage, $\times c. \frac{1}{2}$

Extralimital. China from Kansu and the Tsinling Mts south to Burma, Thailand, Malaysia, Hainan and Borneo. Wanderer to Japan (non-breeding).

BREEDING. Breeds in the eastern Brahmaputra Valley in Assam (Lakhimpur), westward to about Tezpur, in small mixed heronries together with Indian Pond Herons and the usual associates. *Season*, chiefly May to July-August. *Nest* and *eggs* not different from those of the Indian bird, the latter 3 to 5 pale sea green. Average size of 50 eggs 37.7×28.4 mm. (Baker).

MUSEUM DIAGNOSIS. Non-breeding plumage differs from *A. grayii* only in being somewhat more brown and buff on the head and neck, and rather deeper brown on back and scapulars.

MEASUREMENTS

| | Wing | Bill (from feathers) | Tarsus | Tail |
|-----|---------|-------------------------|--------|----------------------|
| ♂ ♀ | 195-238 | 61-69 | 60-64 | 72-90 mm. (Baker) |

COLOURS OF BARE PARTS. Iris deep golden yellow. Orbital skin greenish yellow. Bill yellow, blackish on terminal quarter, bluish at base. Legs and feet yellowish green, the soles still paler; possibly as in *A. grayii* salmon pink in some breeding individuals, but not recorded.

Genus *BUBULCUS* Bonaparte

Bubulcus Bonaparte, 1855, Comp. Rend. Acad. Sci. Paris, 40: 722. Type, by tautonymy, *Ardea ibis* Linnaeus = *Ardea bubulcus* Audouin

Included by some authors in *Ardeola*. Differs from *Egretta* by its shorter bill and feet. Naked portion of tibia shorter than inner toe without claw. Breeding plumage very distinctive, consisting of golden buff hair-like plumes on head and back.

Only a single species inhabiting the warmer parts of Europe and Asia, and all Africa. Has spread to America within recent years.

44. **Cattle Egret. *Bubulcus ibis coromandus* (Boddaert)**

Cancroma coromanda Boddaert, 1783, Table Pl. enlum.: 54 (Coromandel)

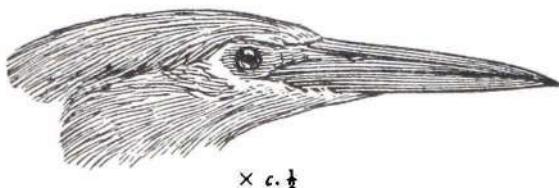
Baker, FBI No. 2226, Vol. 6: 349

Plate 3, fig. 7, facing p. 48

LOCAL NAMES. *Sürkhia-bäglä*, *Badāmi-bäglä*, *Doria bæglä*, *Gai bæglä* (Hindi); *Go bâk*, *Gai bâk* (Bengal); *Samti konga* (Telugu); *Unni kokku* (Tamil, Ceylon); *Harak-kokka* (Sinhala); *Jobogali* (Assam); *Gochändi khão* (Marathi); *Kurk pakki* (Sind); *San-dung-il* (= 'following after cattle' — Manipur); *Kâlimûnti* (Malayalam).

SIZE. Village hen; length c. 51 cm. (20 in.).

FIELD CHARACTERS. In non-breeding plumage a lanky snow-white bird very similar to Little Egret, usually seen in attendance on grazing cattle, not necessarily near water. Always identified from Little Egret by *yellow* bill *contra* black. In breeding plumage unmistakable: golden buff on head, neck, and back, the feathers disintegrated and hair-like. Sexes alike.



STATUS, DISTRIBUTION and HABITAT. Resident, but in the Himalayas migrating to lower elevations in winter. Throughout the subcontinent, Ceylon, and the Andaman, Nicobar, Laccadive, and Maldive islands. Plains, and cultivated Himalayan duns and valleys up to at least 1500 m. altitude (Nepal), and to c. 1200 m. (possibly higher) in the peninsular hills and plateaux (e.g. Sahyadris, Nilgiris), often as a daily commuter from lower levels. Almost invariably in attendance on grazing animals, domestic or wild. In recent years the species has spread to and colonized widely in S. America and the U.S.A.

*Extralimital*ly the race *coromandus* occurs in Burma, the Indochinese countries, Malaysia, S. China, Korea, S. Japan, Formosa, Hainan, Philippines, Sunda islands, Celebes (Sulawesi), and Ceram as resident, migrant, or on passage.

GENERAL HABITS. Gregarious. Usually seen in attendance on grazing village cattle on damp grassy margins of tanks as well as dry fallows and forest glades far removed from water. Also with grazing herds of wild buffaloes, or rhinoceros wallowing in swamps and *bheels* in Assam. The birds stand around amongst or on the backs of the animals fearlessly, or stalk alongside running energetically in and out between their legs and pouncing on grasshoppers and other insects disturbed by the animals' progress. Every now and again the long flexible neck and pointed bill lunges out at the fleeing quarry. Sometimes a bird will complacently settle on and walk along the body of a wallowing animal to explore the inside of its ear or some less accessible part. Blood-sucking flies, ticks and other parasitic insects are picked off the sides and bellies of the grazing animals by the birds springing up for them as they scurry alongside, or from other parts while riding upon the animals' heads or backs. To capture bluebottle flies (*Musca vomitoria*) off the low herbage, the bird poises its bill, cranes forward and sways its neck comically from side to side as if taking aim, and jabs at the insect.

Besides attending on cattle they sometimes collect in large gatherings (of up to several hundred strong) at inundated ploughed fields where the freshly turned up soil provides ample feeding. They consort freely with vultures at slaughter-houses and animal carcase dumps on the outskirts of towns, for the flies and maggots these unsavoury places provide. Cattle

egrets have favourite roost trees, shared with crows, mynas, and other birds, to which they resort every evening flying in a more or less disorderly rabble in the characteristic heron style — neck folded back, head hunched between the shoulders, and legs tucked under the tail, projecting behind like a rudder.

FOOD. Chiefly insects. From stomach contents the following have been identified: Sarcophagidae, *Agrotis* sp. larvae, *Chrotononus* spp., *Acridium aeruginosum* and other grasshoppers, carabid beetles, earth-worms, and flies (Muscidae). To a minor extent tadpoles, frogs and lizards.

VOICE AND CALLS. A low croak uttered when one bird is supplanting another, especially at nest colony. Normally very silent.

BREEDING. Season, mainly June to August in N. India; November to February in the south; February to July in Ceylon. In small to medium sized colonies of its own, but more usually mixed with cormorants, night herons, egrets, etc., in large trees such as mango, tamarind, or peepul, often standing in the midst of a noisy bazaar — even within populous cities like Bombay, Madras, and Calcutta — not necessarily close to water. Eggs, 3 to 5, broad ovals, very pale sea green, almost white or skim-milk blue. Average size of 80 eggs 44.1×36.5 mm. (Baker). Both sexes share in nest building, incubation, and feeding the young by regurgitation as in Purple Heron (q.v.). Incubation period undetermined.

MUSEUM DIAGNOSIS

MEASUREMENTS

| | Wing | Bill (from feathers) | Tarsus | Tail |
|-----|---------|-------------------------|--------|-----------|
| ♂ ♀ | 240-260 | 50-66 | 82-92 | 83-96 mm. |

Males average a little larger than females.

Weight 2 oo? 450, 475 gm. (BNHS).

COLOURS OF BARE PARTS. Iris golden yellow. Bill yellow; orbital and facial skin greenish yellow. Legs and feet black, the upper parts of the tibia, and soles, yellow or greenish yellow (Baker).

Genus EGRETTA Forster

Egretta T. Forster, 1817, Syn. Cat. Brit. Bds.: 59. Type, by monotypy, *Ardea garzetta* Linnaeus

Contains those egrets which in the breeding season develop ornamental plumes on the back as well as, in some cases, on the breast and head. All are white at all seasons with the exception of *E. gularis* and *E. sacra* which are dimorphic with also slaty phase. Smaller than birds of the genus *Ardea* and with much slenderer bills and thinner necks. In winter plumage the species can be distinguished chiefly by size.

See Key, p. 50.

45. Large Egret or Great White Heron. *Ardea alba alba* Linnaeus

Ardea alba Linnaeus, 1758, Syst. Nat., ed. 10, 1: 144 (in *Europa* = Sweden)
Baker, FBI No. 2222, Vol. 6: 345

LOCAL NAMES. Same as next.

SIZE. Grey Heron ±; length c. 96 cm. (38 in.); standing c. 75 cm. to top of head.

FIELD CHARACTERS. A large lanky snow-white heron-like marsh bird with bare blackish legs, long slender neck and head, and pointed black-and-yellow or yellow bill. In the breeding season a bunch of ornamental filamentous plumes (aigrettes) develops on the back, falling over beyond the tail. Sexes alike. Solitary.

STATUS, DISTRIBUTION and HABITAT. Rare winter straggler into West Pakistan and Uttar Pradesh. Affects jheels and marshes.

Extralimital. Breeds in SE. Europe, W. and N. Asia to SE. Siberia, N. China, N. Japan.

GENERAL HABITS. See next.

MUSEUM DIAGNOSIS. For plumages etc. see Witherby 1939, 3: 139.

MEASUREMENTS

| | Wing | Bill (from feathers) | Tarsus | Tail |
|----|---------|-------------------------|---------|-------------|
| ♂♂ | 410-465 | 110-135 | 170-215 | 140-185 mm. |
| ♀♀ | 400-450 | 110-132 | — | — |

COLOURS OF BARE PARTS. Iris yellow. Bill black, base yellow (ad. summer), all yellow (ad. winter & juv.); lores and round eyes green; legs and feet black-brown, sides yellowish, toes greenish black (Witherby).

46. Eastern Large Egret. *Ardea alba modesta* J. E. Gray

Ardea modesta J. E. Gray, 1831, Zool. Misc.: 19 (India)

Baker, FBI No. 2223, Vol. 6: 346

Plate 3, fig. 2, facing p. 48

LOCAL NAMES. *Mäläng bágla*, *Túrra bágla* (?), *Tar bágla*, *Bádā bágla* (Hindi); *Dhár bák*, *Bádā bák* (Bengal); *Bór bög* (Assamese in Nowgong); *Loklenba* (= 'standing in streams' — Manipur); *Peddá tellä konga* (Telugu); *Mala konga* (Gond); *Peria velläi kokku* (Tamil, Ceylon); *Loku sudu kokka*, *Badadel kokka* (Sinhala); *Bdglo áchho* (Sind); *Perümünti* (Malayalam).

SIZE. Grey Heron —; length c. 91 cm. (36 in.).

FIELD CHARACTERS. Slightly smaller, otherwise identical with the foregoing and indistinguishable from it. Size variable and deceptive; thus in non-breeding plumage confusion between some individuals and the Smaller Egret easily possible. In breeding season, especially during various nest ceremonies, the diaphanous lacelike plumes of the back are often erected and spread out in 'showers' — a halo of mist! No crest. Sexes alike.

STATUS, DISTRIBUTION and HABITAT. Resident and nomadic, shifting locally with water conditions. Throughout the subcontinent and Ceylon. Nepal Valley (?) and lowlands, and Maldives Islands in winter. Not recorded in Andaman or Laccadive is.; possible sight record in Nicobars (JBNHS 61: 502). Low country — at jheels and marshes, rivers, tidal estuaries, etc.

Extralimital. Burma, eastward through the Indochinese countries and Malaysia to S. and C. China, S. and C. Japan, south and east to Australia.

GENERAL HABITS. Usually solitary, and seldom more than two or three separated individuals amongst feeding groups of the two smaller species. More gregarious when nesting, but everywhere less abundant, more widely scattered, and less communal than the other egrets. Behaviour and feeding

CICONIIFORMES

habits very similar to the Grey Heron's (q.v.). Flight with rather slow deliberate flapping of the broad wings, typically heron-like — neck telescoped, head pulled in between the shoulders, legs trailing behind. When disturbed and suddenly taking off, and also during short foraging hops, the long slender neck is fully extended, and twisted this way and that, seemingly to counterbalance the swaying legs and produce an even keel.

FOOD. Fish, frogs, crustaceans, water insects, etc.

VOICE AND CALLS. Except for an occasional throaty croak when one bird is supplanting a rival, very silent.

BREEDING. Colonial, in mixed heronries of storks, darters, cormorants, Smaller and Little Egrets, etc. *Season*, July to September in Sind and N. India; November to February in the south; December to May in Ceylon. *Nest*, a flimsy twig platform, c. 25–35 cm. in diameter, seemingly too small for the bird. Built in trees of medium to large size standing by themselves or in a grove or copse, either partially submerged or on raised ground away from water. In the latter case it may be a large peepul or tamarind tree in the midst of a noisy town or overhanging a public highway, with as many as 40 to 50 nests of this species in addition to others'. Babool (*Acacia arabica*) and kandi (*Prosopis spicigera*) trees in the Keoladeo Ghana Sanctuary of Rajasthan, and tamarisks in the riverain and canal areas of Sind, are commonly patronized. The nests here are scattered amongst those of other species in the heronry without any suggestion of segregation. *Eggs*, 3 or 4, smaller but otherwise identical with those of the Grey Heron. Average size of 60 eggs 54·0 × 38·6 mm. (Baker). Both sexes build the nest, incubate, and feed the young by regurgitation, as described. Incubation period unrecorded; in the nominate race (*alba*) it is said to be 'probably 25–26 days'.

MUSEUM DIAGNOSIS. For description of plumages etc. see Witherby 1939, 3: 139 for the nominate race, from which *modesta* differs only in being smaller. Generally distinguishable from *Egretta i. intermedia* (next species) by its wing length of over 350 mm. and tarsus over 160 mm. *contra* wing under 350 and tarsus under 150 mm. But females are smaller, and furthermore there is considerable individual variation in size, sometimes producing an overlap or near-overlap in these measurements. Therefore, identifying individual examples in non-breeding plumage is not always satisfactory, and in some cases even impossible.

MEASUREMENTS

| | | | Wing | Bill (from feathers) | Tarsus | Tail |
|-----------------|------|--|---------|-------------------------|-----------|-------------|
| China specimens | 5 ♂♂ | | 360–370 | 109–111 | 173·5–175 | 139–150 mm. |
| (Foochow) | | | | | (one 163) | |
| | 4 ♀♀ | | 345–361 | 95–104 | 152–157 | 130–143 mm. |

Breeding males have the train of dorsal ornamental plumes projecting from about 92 to 165 mm. beyond tip of tail; females about 38 to 90 mm. (La Touche 1931–4, 2: 446).

| | | | Wing | Bill (from skull) | Tarsus | Tail |
|-----------------------|------|--|---------|----------------------|---------|-------------------------|
| Indian specimens | 6 ♂♂ | | 355–375 | 103–117 | 146–165 | 125·5–143 mm. |
| (Gujarat & Ceylon) | 6 ♀♀ | | 337–365 | 97–100·5 | 136–160 | 120–138 mm. (SA, HW) |

Baker gives the range of *modesta* ♂♀ as Wing 354–391; bill (from feathers) 104–116 mm. and says 'Bill much more slender than in *E. a. alba*'

COLOURS OF BARE PARTS. Breeding: Iris bright lemon-yellow. Bill black, yellow at base. Orbital skin and lores bright verdigris green. Legs: tibia bright rose-pink; tarsus and feet pinkish brown or black. Non-breeding: Bill orange-yellow. Orbital and facial skin greenish yellow. Legs, feet, and claws, black.

MISCELLANEOUS. Longevity, *A. a. alba*: c. 10 years (*Ring*, 1962, 33: 148).

47, 48. Smaller or Median Egret. *Egretta intermedia intermedia* (Wagler)

Ardea intermedia Wagler, 1829, *Isis von Oken*, col. 659 (Java)

Egretta intermedia palleuca Deignan, 1947, Proc. Biol. Soc. Washington 60(1): 97
(Muang Chiang Rai, Siam)

Baker, FBI No. 2224, vol. 6: 347

LOCAL NAMES. *Pātāngkhā bāglā*, *Pātokhā bāglā*, *Kārchiā bāglā* (Hindi); *Korché bāk* (Bengal); *Bāglo āchho* (Sind); *Lāng khong sāng* (Manipur); *Vellai kokku* (Tamil); *Sudu kokka* (Sinhala); *Tellā konga* (Telugu).

SIZE. Length c. 45 cm. (26 in.).

FIELD CHARACTERS. Slightly smaller, otherwise very like Eastern Large Egret; non-breeding birds often indistinguishable from it. In breeding plumage presence of decomposed filamentous plumes on back as well as breast diagnostic. No crest. Sexes alike. Less solitary than Large, less gregarious than Little Egret.

STATUS, DISTRIBUTION and HABITAT. Resident and nomadic, shifting locally with water conditions. Throughout the subcontinent, Ceylon, Andaman and Nicobar islands. Low country and plateaux; to about 1400 m. altitude in Nepal Valley. Affects jheels, marshes, inundations; also coastal backwaters, tidal estuaries, and mangrove swamps.

Extrazonal. Burma, Thailand, Indochinese countries, Malaysia, east to China and Japan, south to Greater Sunda Is. and the Philippines. Resident in some of the areas, migratory in others.

GENERAL HABITS. Not different from Large Egret except that it is somewhat more social even in the non-breeding season, occasionally seen in small flocks.

BREEDING. Colonial, in mixed heronries with the usual associates. Season, nest, and nest sites as in the previous species. In Sind inundated tamarisk forest, and in Kutch and other coastal areas tidal mangrove forests are commonly resorted to for nesting. Eggs, 3 or 4, sometimes 5, pale sea green, smooth-surfaced broad ovals. Average size of 60 eggs 47·6 × 35·8 mm. (Baker). As in other egrets, both sexes share all domestic chores. Incubation period undetermined, but believed to be about 21 days.

MUSEUM DIAGNOSIS. For distinguishing this from *E. a. modesta* see remarks under that species.

Egretta intermedia palleuca Deignan is based on the mistaken premise that eastern birds retain a yellow bill at all seasons. La Touche (1931–4, 2: 447), and Smythies (1953: 529) both describe the bill as black in the breeding season, and the former as 'yellow, pointed with black in winter', therefore exactly as in typical *intermedia* from western India. There seems no justification for retaining this race.

MEASUREMENTS. Baker gives as follows:

| | Wing | Bill (from feathers) | Tarsus | Tail |
|-----|-----------------------|----------------------------------|-----------------------|-------------|
| ♂ ♀ | 304-333 (once 354) | 73-97 (twice 68, once 118) | 122-148 (once 114) | 116-135 mm. |
| | | | | |
| | | | | |

Three specimens from Travancore, Ceylon and Rajasthan measure:

2 ♂ ♂ wing 302, 316; bill (1) 94 (from skull), (1) 77.5 (from feathers); tarsus 111.5, 120; tail 121.5, 124 mm. 1 ♀ wing 294; bill (from feathers) 69; tarsus 102; tail 117 mm.

Weight 1 o? 900 gm. (BNHS).

COLOURS OF BARE PARTS. Iris lemon-yellow. Bill black, yellow at base (breeding); lemon-yellow, dusky at tip browner at base (non-breeding). Naked lores and infra-orbital skin yellowish green (breeding); yellowish (non-breeding). Legs and feet dusky black, greenish on the joints and tibia. Rose-pink or salmon-pink in legs of breeding birds unrecorded in this species.

49. Little Egret. *Egretta garzetta garzetta* (Linnaeus)

Ardea Garzetta Linnaeus, 1766, Syst. Nat., ed. 12, 1: 237

('Oriente' = northeast Italy)

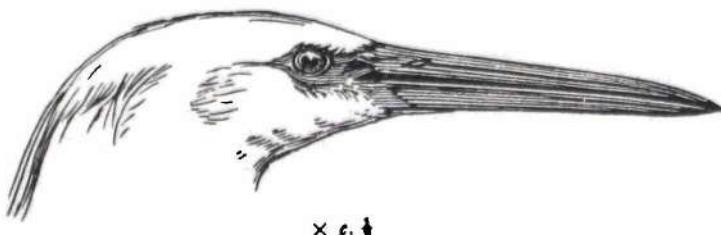
Baker, FBI No. 2225, Vol. 6: 348

Plate 3, fig. 3, facing p. 48

LOCAL NAMES. *Kilchia* or *Kärchiā bāglā* (Hindi); *Bārāro* (Sind); *Chhota korché bāk* (Bengal); *Teteri bog* (Assamese in Nowgong); *Chinnā tellā konga* (Telugu); *Chinnā vellai kokku* (Tamil, Ceylon); *Sudu kokka* (Sinhala); *Chinnamūnti* (Malayalam).

SIZE. Village hen ±, with longer neck and legs; length c. 63 cm. (25 in.).

FIELD CHARACTERS. A lanky snow-white waterside bird — smaller replica of the Large and Median Egrets. Similar also to non-breeding Cattle Egret but distinguished from it at all seasons by black v. yellow bill, parti-coloured legs and feet (black and yellow), and also usually by habitat. In breeding season develops a drooping nuchal crest of two long narrow plumes in addition to filamentous ornamental feathers on both back (scapulars) and breast; the latter less decomposed. Sexes alike.



STATUS, DISTRIBUTION and HABITAT. Resident, shifting locally with water conditions. Throughout the subcontinent, chiefly lowlands and plateaux; to about 1400 m. altitude in the Himalayas (Nepal Valley) and at least 900 m. in the peninsular hills. Also Ceylon, Andaman, Nicobar, Laccadive (?), and Maldives islands. Affects inland waters — marshes, jheels, inundated paddyfields, etc. Rarely tidal estuaries, mudflats and backwaters; hardly ever the seashore.

Extralimital. S. and E. Europe, N. and E. Africa, Middle East, Iran, Afghanistan, Burma, Malaysia, east to China, Hainan, and Japan. Partly migratory.

GENERAL HABITS. More gregarious than the two larger white egrets, usually in flocks on the edge of water or wading in the shallows. Still-hunts or stalks prey in the characteristic heron manner, lunging out with its flexible neck and dagger bill to seize the quarry. Flies with steady but leisurely flaps of the broad rounded wings, head and neck drawn in when commuting or on long flights. Roosts on favourite trees ('rookeries') in association with other species.

FOOD. Fish, frogs, crustaceans, water insects, etc.

BREEDING. Colonial, in mixed heronries. *Season*, July to September in Sind and N. India; November to February in the south; December to May in Ceylon — dependent on water conditions. *Nest*, the typical flimsy cupped structure of twigs — only slightly more substantial than a dove's — placed 2 to 6 metres up in a tree, single or one of a grove standing in a tank or jheel, or on dry land; sometimes away from water and in the midst of a village or town. The nests are often close together, even touching others of the same or different species. Inundated tamarisk forests in Sind, and partially submerged babool and kandi jungle in monsoon-flooded semi-desert areas in NW. India (Kutch, Rajasthan, etc.) are favourite nesting sites. Similarly situated *Barringtonia racemosa* groves and *Pandanus* thickets in South India (Vedanthangal in Madras; Srirangapatnam in Mysore), and mangroves in the Bengal Sunderbans are also regularly patronized. But smaller heronries are scattered all over the country. *Eggs*, 3 to 5, typically heron, pale blue-green broad ovals with a smooth texture. Average size of 60 eggs 44.4×31.7 mm. (Baker). As in the family, both sexes share all the domestic chores. Feeding of young etc. as in the species described. Incubation period 21—25 days.

MUSEUM DIAGNOSIS. For details of plumages etc. see Witherby 1939, 3: 141.

MEASUREMENTS

| | Wing | Bill (from feathers) | Tarsus | Tail |
|-----|---------------|-------------------------|---------|-----------------------|
| ♂ ♀ | 257-289 | 79-91 | 99-110 | 92-108 mm. (Baker) |
| ♂ ♂ | 260-295 | 85-92 (from skull) | 100-110 | 90-110 mm. |
| ♀ ♀ | (240) 250-282 | 78-90 | | — (Witherby) |

Weight 5 oo? 320-420 (av. 390.6) gm. (BNHS).

COLOURS OF BARE PARTS. (Breeding and non-breeding) Iris yellow. Facial skin greenish yellow. Bill black, the gape and base of lower mandible yellowish. Tarsus and tibia black; feet yellow, greenish yellow, or mixed black and yellow; soles almost all yellow. In a female in breeding condition from Nepal, 'Ocular skin bluish purple. Bill black, base of upper mandible bluish purple, lower mandible with a small basal area of bluish purple. Legs black, feet orange-yellow' (Ripley).

MISCELLANEOUS. *Egret Farming.* Some years ago this species used to be extensively and lucratively farmed by the *mirbahars* or *mohanas* (inland

fisherfolk) of Sind on many of the local dhands (jheels) for their valuable ornamental plumes known to the trade as 'aigrettes' or 'ospreys'. The birds were pinioned and housed in spacious pens of reed matting — 50 or 60 couples to a pen — where they moved about freely and became quite tame. They were well fed and cared for, and between March and September they paired off, built their own nests from twigs provided by the owners, laid from 3 to 5 eggs, and incubated them. After hatching the chicks were left with the parents for about a week, then removed and hand reared. They attained maturity in about 12 months. The parents commenced laying a second clutch almost immediately after the removal of the brood, and soon brought up another family. In this way they sometimes produced 4 and even 5 successive clutches during the season. The dorsal plumes were extracted in a humane manner without injury to the birds. There were four pluckings — one every three months — and each bird seldom produced less than a *tola* (11.66 gm.) in the year. Round about the year 1914, the feathers fetched from Rs. 10 to Rs. 15 per *tola* in the Indian market (even '10 to 28 times their weight in silver'), but as much as £15 per oz. (28.35 gm.) when smuggled to Europe, a trade which was apparently practised on a large scale by specialists in the business! The lack of official encouragement to this profitable cottage industry by a controlled relaxation of the ban on export of wild birds' plumage in favour of genuinely farm-produced feathers — but even more the change in women's fashions in clothing — has virtually put an end to the egret-farming industry. But to our knowledge some small egret farms existed in Sind up to 1930, and some may possibly survive to this day. While the farming concerned the Little Egret almost exclusively, before statutory protection was given enormous numbers of egrets of all species were slaughtered by gangs of professional hunters, armed with snares and muzzle-loading guns, who scoured the countryside visiting one breeding herony after another and systematically slaying the adults, often leaving the nestlings, to starve and perish. In the more accessible areas this vandalism had reduced the egret population to the verge of extinction. The species that suffered most were the three white egrets — *E. alba*, *E. intermedia* and *E. garzetta*, but to a lesser degree also the Cattle Egret (*Bubulcus ibis*) and the Reef Heron (*Egretta gularis*). (For detailed accounts see articles on 'Egret Farming in Sind', JBNHS 23: 161; 27: 944; 28: 748, 751.)

50. Indian Reef Heron. *Egretta gularis schistacea* (Hemprich & Ehrenberg)

Ardea (Leptorodas) schistacea Hemprich & Ehrenberg, 1832, Symb. Phys. Aves, (p. 12), pl. 6 (Red Sea)

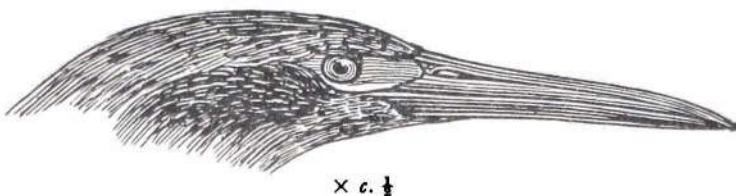
Ardea Asha Sykes, 1832, Proc. Zool. Soc. London : 157 (Dukhun)
Baker, FBI No. 2228, Vol. 6: 353

Plate 5, fig. 3, facing p. 96

LOCAL NAMES. *Kälä bágla* (Hindi); *Thirdmanti* (Malayalam); *Theerápū kongā* Telugu; *Käraí kokka*, *Kärpū källūváyin* (Tamil).

SIZE. Same as Little Egret; length c. 63 cm. (25 in.).

FIELD CHARACTERS. General effect as of Little Egret, but dimorphic. Adult in two colour phases: (1) pure white, (2) slaty grey to slaty blue-black, with glistening white throat and upper foreneck. Some examples intermediate, partly white partly slaty. In breeding plumage a nuchal crest of two elongated narrow plumes and same sort of filamentous plumes on back and breast as in Little Egret. White phase indistinguishable from Little Egret except by more solitary habit and seacoast habitat. Sexes alike in both colour phases.



Sub-adult (dark phase?). *Above*, pale ashy grey. *Below*, chin and throat white; upper foreneck grey; lower foreneck, breast and underparts including under tail-coverts and inner thighs, white.

STATUS, DISTRIBUTION and HABITAT. Resident, nomadic, and local migrant (see Breeding). Northern shores of the Arabian Sea and seaboard of West Pakistan (where very common); shores of western India south to Kanyakumari, and of northwest Ceylon; Laccadive Is. Rare on the eastern coast, only recently recorded as resident and breeding from east of Nellore and in the neighbourhood of Pulicat lagoon (Kirkpatrick, JBNHS 58: 275). Affects sandy and rocky seashores, tidal lagoons and mudflats, and mangrove swamps. Once far inland, Hyderabad, A.P. (Neavoll, 1967, JBNHS 65: 216).

Extralimital. Coasts of Red Sea, Gulf of Aden, and Persian Gulf.

GENERAL HABITS. Solitary and somewhat crepuscular. Occasional separated twos and threes, both colour phases together. Gregarious at nest colonies. Wades stealthily into shallow surf on tidal mud, or among rock pools left by receding tide, and secures prey by jabbing at it with the pointed bill and flexible neck. Often seen sitting hunched up on a partly submerged rock or fishing stake patiently waiting for the tide to ebb to resume hunting. While stalking in the shallow surf, sometimes suddenly raises unopened wings at the armpits, level with the back, crouching forward furtively on flexed legs (as in a bird about to settle on eggs), wading deeper almost to belly, peering intently into the water, neck craned out and bill poised in readiness. From time to time also suddenly flicks the wings open and shut, quite obviously to stampede lurking or 'frozen' prey by the sudden movement. Flight and general behaviour not different to Little Egret's, though usually more mobile and active when hunting.

FOOD. Fish, crabs, molluscs, etc. The mudskipper (*Periophthalmus*), procured in tidal mud, is a regular food item of adults and nestlings.

VOICE and CALLS. Very silent. A short throaty croak sometimes heard when one bird is supplanting a rival.

BREEDING. Colonial, usually in segregated heronries of own species, but also mixed with other egrets and pond and night herons. *Season*, between

April and August in Sind (Karachi city and harbour) and Kutch (Gul of Kutch); end of May in Ceylon (Chilaw; rare). No record elsewhere in between, therefore possibly migrates locally to special areas. Nest, the usual untidy structure of twigs, occasionally plucked green and with leaves still attached. In large trees such as peepul (*Ficus religiosa*), jamun (*Eugenia jambolana*), Rain Tree (*Pithecelobium dulce*) and others standing on dry ground, with the colony overflowing on to adjacent trees. But the normal site is coastal mangrove swamps subject to inundation at high tide, the nests being placed in trees and bushes of *Rhizophora*, *Avicennia*, and *Sonneratia*, etc. Both the dark and pale phases breed together in the same colony, but white mated to white and slaty to slaty only; no evidence here of slaty and white birds paired together as in Africa. Eggs, 3 or 4, exactly like those of the Little Egret in colour, shape, and texture of shell. Average size of 50 eggs 44.9×34.3 mm. (Baker). Both sexes share all the domestic chores. As in most herons the male collects the twigs and fetches them to the nest where the female puts them together. Incubation commences with the first egg, accounting for marked disparity in growth of young in the same brood. Nest-feeding done by regurgitation as described. Period of incubation undetermined. The nests contain either all white or all grey chicks each. Only a single case observed of 2 white, 1 grey (one of the parents was white, the other not seen). None of the white chicks are snow-white, all being more or less dappled with grey, thus different from Little Egrets'. No adult white bird retains the grey dappling, but adult slaty birds frequently show small asymmetrical white patches on the wings.

MUSEUM DIAGNOSIS. In skins extremely difficult to distinguish *E. garzetta garzetta* from white phase of *E. gularis schistacea*. Proportions and colours of legs and toes (particoloured) the same in both. Plumages both breeding and non-breeding also identical, including the ornamental plumes. The only constant difference is: bill black in the always white *E. garzetta garzetta* against horny brown or even yellowish in *E. gularis schistacea*, whether in the dark or the white phase. It has been suggested that the dimorphic *E. g. schistacea* may only be ecological populations of *E. g. garzetta* adapted to a marine habitat. Contrary to experience in India, dark and white birds often found paired together in the same colonies in Africa, and dark and white chicks in the same nest. Furthermore, in East Africa *E. g. garzetta* has several colour phases — pale lavender grey, sooty grey, dark sooty grey, and blackish slate, with intermediates. The problem of these colour phases is not properly understood. The different coloration does not depend on age or sex.

MEASUREMENTS

| | Wing | Bill | Tarsus | Tail |
|-----|---------|---------------------------|--------|------------------------|
| ♂ ♀ | 267-301 | 94-101 (from feathers) | 97-102 | 102-112 mm. (Baker) |

Weight 5 oo? 355-460 (av. 421) gm. (BNHS).

COLOURS OF BARE PARTS. Variable. Adult: Iris yellow. Bill horny brown above, yellowish at base and on lower mandible; or largely bright yellow (in slaty phase). Legs and feet particoloured as in *E. garzetta*: tarsus greenish black; toes yellowish brown (dark phase), largely yellow or greenish yellow (white phase).

In small nestlings, naked skin between feather buds, and apteria, yellowish grey-green. Legs and feet yellowish green and brown.

Iris greenish grey in very young; lighter grey (almost whitish) in older nestlings.

51. **Eastern Reef Heron.** *Egretta sacra* (Gmelin)

Ardea sacra Gmelin, 1789, Syst. Nat. 1(2): 640 (Tahiti)
Baker, FBI No. 2227, Vol. 6: 351

LOCAL NAMES. Unrecorded.

SIZE. Length c. 58 cm. (23 in.).

FIELD CHARACTERS. Slightly smaller than the last, otherwise of same general effect and maritime habitat.

Adult. Also dimorphic like No. 50: (1) pure white, (2) dark slaty grey or slaty black, with a white streak down middle of chin and throat. In breeding plumage both phases distinguishable from *E. g. schistacea* by a bushy nuchal crest, *contra* crest of two lanceolated plumes in the latter. Feathers of lower foreneck long, lanceolate, overhanging breast. Long lanceolate plumes on back (scapulars and interscapulars) reaching to middle of tail, ending in paler slaty grey than rest of plumage. Sexes alike.

Sub-adult. Pied or mottled, in intermediate colour stages.

STATUS, DISTRIBUTION and HABITAT. Resident in the Andaman and Nicobar islands. Affects rocky portions of the coasts.

Extralimital. From the eastern coasts of the Bay of Bengal eastward — Burma, Malaysia, to the coasts of southern China Sea, S. Korea, S. Japan, Philippines, Sunda Islands, Moluccas, Celebes, New Guinea, South Pacific islands, N. Australia, New Zealand.

GENERAL HABITS. Very similar to the last. Solitary. Keeps to the rocky sea coast and squelchy tidal mud exposed at low water, or sits hunched up on a partially submerged rock or mangrove tree waiting for the ebb.

FOOD. Fish, especially the mudskipper (*Periophthalmus*), crabs, and occasionally insects, such as grasshoppers, obtained on bare ground above tide level.

VOICE. An occasional 'grunted croak or *ork* when feeding, presumably to signalize the acquisition of an unduly tasty morsel'. Also a longer harsher, *ark* when alarmed (Gibson-Hill). Normally silent.

BREEDING. Colonial. Season, May to July and up to September. Nest, the usual rough untidy stick platform. Placed on rocks in hollows and crevices, in stunted *Ficus* trees, low thorny bushes up to a metre from the ground, or more commonly among mangrove trees in creeks, sometimes just above high-water mark (B. B. Osmaston). Eggs, 3 or 4, pale sea green, typical of the herons. Average size of 50 eggs 44.8 × 33.3 mm. (Baker).

MUSEUM DIAGNOSIS. For details of plumages, and a very full discussion of the colour phases etc., see A. O. Hume 1874, *Stray Feathers*, 2: 304-9.

MEASUREMENTS

| | Wing | Bill (from feathers) | Tarsus | Tail |
|-----|---------|-------------------------|--------|----------------------|
| ♂ ♀ | 250-293 | 70-86 | 72-77 | 93-98 mm. (Baker) |

COLOURS OF RARE PARTS. Variable. Iris yellow. Bill horny brown above, yellowish at base and on lower mandible; often yellow all over in white birds. Legs varying from pale yellowish green (in white birds) to deep dull greenish or nearly black (in dark individuals).

Genus *NYCTICORAX* T. Forster

Nycticorax T. Forster, 1817, Syn. Cat. Brit. Bds.: 59. Type, by tautonymy and monotypy, *Nycticorax infaustus* Forster = *Ardea nycticorax* Linnaeus

Bill very stout and deep, much compressed, with culmen distinctly curved; upper mandible notched close to tip. Head short and comparatively thick with nuchal crest of a few narrow feathers. Wings rounded: 3rd primary (as.) longest. Tail short, of 12 feathers. Only upper part of tibia feathered. Tarsus long and stout, about equal to culmen in length, scutellated in front, reticulated behind.

Genus practically cosmopolitan.

52. Night Heron. *Nycticorax nycticorax nycticorax* (Linnaeus)

Ardea Nycticorax Linnaeus, 1758, Syst. Nat., ed. 10, 1: 142 (Southern Europe)

Baker, FBI No. 2233, Vol. 6: 359

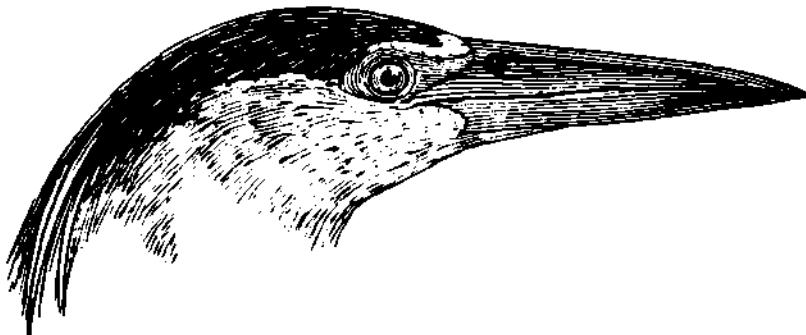
Plate 3, fig. 10, facing p. 48

LOCAL NAMES. *Waak*, *Kwaak*, *Tār bāglā*, *Kōkrāi* (Hindi); *Bōr* (Kashmir); *Bachka* (Bengal); *Chongku* (Manipur); *Raat büggül*, *Raat kokkū*, *Rāj kōk* (Marathi); *Awaak*, *Waak* (Gujarat); *Gadri* (Sind); *Chinta wākha* (Telugu); *Vākka* (Tamil); *Toppi kokkū* (Malayalam); *Re kāna kokkā* (Sinhala).

SIZE. Pond Heron; length c. 58 cm. (23 in.).

FIELD CHARACTERS. A stocky grey, white and black marsh bird of the same general effect as the Pond Heron, with a markedly stouter bill.

Adult. *Above*, ashy grey with metallic greenish black back and scapulars. Forehead and a streak over eye white; crown, nape, and drooping occipital crest black, the last with a few long narrow white plumes. *Below*, white; sides of body ashy grey. Sexes alike.



x c. 1

Young (immature). Brown, streaked and speckled with rufous, buff, and dark brown — rather similar looking, when at rest, to Pond Heron in non-breeding plumage.

STATUS, DISTRIBUTION and HABITAT. Resident. Patchily distributed, and shifting locally with water conditions. Throughout the subcontinent, up to c. 1900 m. in the Kashmir and Nepal valleys in spring and summer; most moving southward in winter. Ceylon, Andaman and Nicobar islands.

Not recorded from the Laccadives or Maldives. Affects jheels, tanks, streams, and ponds, as well as estuaries, tidal creeks, coastal lagoons and backwaters.

Extralimital. Central and southern Europe, south to Africa. Middle East, Burma, Thailand, Malaysia, the Indochinese countries to China and Japan.

GENERAL HABITS. Gregarious, crepuscular and nocturnal except in breeding season. Colonies from a dozen to several hundred birds spend the daytime roosting in the seclusion of dense *Pandanus*, mangrove or other bushes bordering or overhanging water, or covering a little islet in a river. A grove of large leafy trees or a bamboo copse on dry ground, maybe in the vicinity of a village—lofty chenars in Kashmir—do equally well. Here the birds sit sluggishly in their characteristic hunched posture, neck drawn into the body, shoulders and back rounded, and blood-red eye staring unblinkingly. Owing to their silent and secretive habits such daytime roosts, even large and populous ones, are liable to be overlooked unless some disturbance causes the birds to fly out, when they will mill around like a rabble of flying foxes before resettling. At dusk they bestir themselves, flying out singly or in small parties in different directions to their accustomed feeding grounds by some jheel or creek. Except when foraging for nest-young, feeding is chiefly done in the morning and evening twilight, and during the night. The birds are active in the quest for food and seldom still-hunt in the manner of true herons. The flight is strong and direct, with quick flaps of the rounded wings—reminiscent in the distance, and in silhouette, of a flying fox. The thick-set neck is pulled in and shortened, but not folded in an S as in the Grey Heron. At the communal roosts and heronries emotion of any kind between individual birds is expressed by a momentary raising of the crest and fluffing out of feathers of the neck, breast and back, followed occasionally by a jab of the bill at a neighbour.

VOICE AND CALLS. A single unmistakable raucous *wock* or *kwaark* is uttered from time to time while flighting to and from the feeding grounds. Partially fledged chicks in the nest or when out clambering among the adjacent branches keep up an incessant clamour, *click, click, click*, etc. for being fed.

FOOD. Fish, frogs, aquatic insects, dragonfly larvae, etc.

BREEDING. Colonial. Often in pure colonies of its own, or in segregated *mohallas* in mixed heronries, or even individually in uneasy proximity of nests of cormorants, egrets, and pond herons. *Season*, April-May in the Vale of Kashmir; June-July to September in N. India generally; December to February in S. India; December to September in Ceylon. *Nest*, a rough untidy platform of twigs, sometimes flimsy enough for the eggs to be seen from below. Placed in the same sort of sites as used for daytime roosts—trees, *Pandanus* or tamarisk bushes standing in or near water, or groves of trees (often lofty, as chenars in Kashmir) on dry land. *Eggs*, 3 or 4, rarely 5, typical of the family, pale blue green, longish ovals. Average size of 50 eggs 49.0×35.1 mm. (Baker). Both sexes take part in all the domestic chores. The nest material is evidently collected chiefly by the male. Incubation period not ascertained; given as 21 days for European birds. Great disparity in chicks of same brood owing to the eggs being laid at about 48-hour intervals and incubation commencing with the first egg. Chicks fed by

regurgitation, as in the family, the parent's bill being seized and violently pulled down into the nest to induce disgorgement. Courtship display described in Witherby 1939, 3: 148-9.

MUSEUM DIAGNOSIS. For details of plumages etc. see Witherby 1939, 3: 150-2.

MEASUREMENTS

| | Wing | Bill (from feathers) | Tarsus | Tail |
|-----|---------|-------------------------|--------|-----------------|
| ♂ ♂ | 265-300 | 65-80 | 65-75 | 95-110 mm. |
| ♀ ♀ | 270-285 | 66-75 | — | — (Witherby) |

Weight 1 ♂? 275 gm. (BNHS)

COLOURS OF BARE PARTS. Iris blood-red. Bill black, greenish yellow at base and on most of lower mandible. Naked lores and orbital skin yellowish green. Legs and feet dull green. In breeding season bill blacker; legs and feet lemon-yellow, orange-red, or pinkish red.

MISCELLANEOUS. Longevity (in captivity): 18+ years (PZS, 125: 535).

Genus *GORSACHIUS* Bonaparte

Gorsachius Bonaparte, 1855, Conspl. Av., 2: 138. Type, by monotypy, *Nycticorax goisagi* Temminck

Plumage variable. Bill as stout as in *Nycticorax* but much shorter. Culmen shorter than tarsus. Nostrils large, linear, open. Tarsus short, stout, reticulated throughout. Feet small, the toes bordered by a narrow membrane. Tail short, of twelve feathers. Head crested; neck short and thick. Wing rounded: 2nd, 3rd and 4th primaries (as.) subequal, the 3rd usually slightly the longest.

53. **Malay or Tiger Bittern.** *Gorsachius melanolophus melanolophus* (Raffles)

Ardea melanolophia Raffles, 1822, Trans. Linn. Soc. London, 13(2): 326

(Western Sumatra)

Baker, FBI No. 2234, Vol. 6: 361

Plate 7, fig. 1, facing p. 144

LOCAL NAMES. *Rāj bōg* (Assam); *Thāvittu kokku* (Malayalam); *Re kokka* (Sinhala).

SIZE. Pond Heron +; length c. 51 cm. (20 in.).

FIELD CHARACTERS. An unmistakable relation of the Pond and Night Herons. Reminiscent also of a large Chestnut Bittern (q.v.).

Adult. *Above*, crown and long bushy nuchal crest ashy black. Back and rest of upperparts largely chestnut-cinnamon, closely and finely barred with black (hence sometimes called Tiger Bittern). Primaries and secondaries greyish black with chestnut and white tips. Tail black, rufescent at tip. *Below*, chin and throat white; foreneck and upper breast sandy-rufous streaked with black. Rest of underparts white, blotched and spotted with black and rufous on lower breast and abdomen. Sexes alike.

Young (immature). *Above*, head almost black; nape and long crest feathers streaked with white. Rest of upper plumage dark brown spotted with white, the wings and scapulars with wavy buff barring. *Below*, chin and throat white with a central dark brown streak. Rest of underparts white to buff, spotted and barred with dark brown, densely on breast lightly on abdomen and flanks.

STATUS, DISTRIBUTION and HABITAT. One of the peculiar discontinuously distributed Indo-Malayan species of evergreen biotope. Resident in the heavy rainfall areas of the southern Western Ghats — Kerala, W. Mysore (including Nilgiris) north to about Belgaum ($c. 15^{\circ} 50' N. \times 74^{\circ} 31' E.$); Assam, Manipur. Winter visitor to Ceylon. Foothills and up to at least 800 m. altitude in SW. India; up to $c. 1800$ m. in Ceylon. Frequents streams and marshy patches in thick forest.



Extralimital. Burma, Thailand, Malaysia, Indochina, S. China, Formosa, Borneo, Sumatra, Java.

MIGRATION. Very little known. Regular winter visitor to Ceylon arriving on the west coast in October and November. At Jatinga in the Haflong district ($c. 25^{\circ} N. \times 93^{\circ} E.$) and in certain other valleys of Assam, birds of this species, along with several others usually considered non-migratory, are regularly attracted in large numbers to lights displayed by the villagers. Jatinga lies on a spur flanking the valley at an altitude of about 600 m., and the appearance of the birds on dark cloudy overcast monsoon nights between August and October, flying in a north-south direction, is clearly suggestive of some sort of migratory passage. Further investigation is desirable. (For a fuller account see Sálim Ali, 1962, JBNHS 59 (1): 128–30.)

GENERAL HABITS. In many respects similar to those of the Night Heron; largely nocturnal. Excessively shy and difficult to approach or observe, but perhaps less rare than generally believed. When disturbed feeding at a water-hole in dense forest, it flies off noiselessly with a rapid flapping of wings, alighting a short distance away in a thick tree, whence it moves on again before it can be approached.

VOICE and CALLS. On the whole very silent. Besides a short croak and hisses uttered by an incubating bird when closely approached, nothing recorded. When hungry, captive birds uttered 'a rasping *ark ark ark* (*a* as in "hat")' — G. M. Henry.

FOOD. Fish, frogs, lizards, molluscs, insects, etc.

BREEDING. Season, in Assam chiefly May and June; in SW. India end May to August, during the heaviest rains. Nest, a flimsy structure of twigs like the Pond Heron's, sometimes with a lining of reeds etc. Usually placed between 5 and 8 m. up in a small tree overhanging a stream in thick forest. Not concealed, but easily overlooked. Rarely in reed beds. Eggs, 3 to 5, white

CICONIIFORMES

with a bluish tinge; broad ovals occasionally slightly pointed at the small end. Average of 40 eggs 46.2 x 37.2 mm. (Baker). Though ordinarily so shy, the bird is a close sitter, hissing and croaking at the intruder and refusing to leave its nest till almost touched. Share of the sexes in nest building, incubation and feeding the young unrecorded. Period of incubation unknown.

MUSEUM DIAGNOSIS

MEASUREMENTS

| | Wing | Bill (from feathers) | Tarsus | Tail |
|-----|---------|-------------------------|----------|-----------------------|
| ♂ ♀ | 255-281 | 43-49 | c. 67-79 | 96-112 mm. (Baker) |

COLOURS OF BARE PARTS. Iris golden yellow. Bill fleshy yellow, the culmen and tip horny brown. Orbital skin greenish slate, suffused with red in the breeding season. Legs and feet dull green, brownish in front.

54. Nicobar Tiger Bittern. *Gorsachius melanolophus minor* Hachisuka

Gorsachius melanolophus minor Hachisuka, 1926, Ibis: 592

(Katchel Island, Nicobar Is.)

Baker, FBI No. 2235, Vol. 6: 363

LOCAL NAMES. Unrecorded.

SIZE. Slightly smaller than the foregoing.

FIELD CHARACTERS. As in No. 53.

STATUS, DISTRIBUTION and HABITAT. Apparently resident, but rare. Nicobar Islands (obtained at Katchel, Tillangchong, False Harbour, etc.). Frequents streams and swampy patches in thick forest.

GENERAL HABITS. As described under No. 53.

BREEDING. Not recorded.

MUSEUM DIAGNOSIS. As No. 53, but smaller. Plumage very variable.

MEASUREMENTS

| | Wing | Bill (from feathers) | Tarsus | Tail |
|-----|---------|-------------------------|----------|----------------------|
| ♂ ♀ | 224-234 | 40-42 (once 44) | c. 61-67 | 80-88 mm. (Baker) |

COLOURS OF BARE PARTS. As in the nominate race (No. 53).

Genus *Ixobrychus* Billberg

Ixobrychus Billberg, 1828, Syn. Faun. Scand., 1(2): 166. Type, by subsequent designation, *Ardea minuta* Linnaeus. (Stone, 1907, Aut., 24: 192.)

Bill straight and slender; culmen flat at base with a broad shallow groove on each side of upper mandible. Tarsus rather short, equal to about two-thirds of the culmen. Back of neck almost denuded of feathers, though this concealed by feathers of side of neck. Head crested. Feathers of upper breast very soft and lax; no dorsal or scapular plumes. Tail short, often of ten feathers only.

Genus almost cosmopolitan except in the northern Holarctic Region.

55. Little Bittern. *Ixobrychus minutus minutus* (Linnaeus)*Ardea minuta* Linnaeus, 1766, Syst. Nat., ed. 12, 1: 240 (Switzerland)

Baker, FBI No. 2236, Vol. 6: 364

Plate 5, fig. 10, facing p. 96

LOCAL NAME. *Goi* (Kashmir).

SIZE. Pond Heron—; length c. 36 cm. (14 in.).

FIELD CHARACTERS. A 'hunchbacked' waterside bird, similar in general effect to the Pond Heron. In flight whitish shoulder patch contrasting with blackish wings, suggestive of identity.

Male (adult). *Above*, black, including crown, nape, crest, back, scapulars, rump, tail, and innermost secondaries. A large lavender-grey to whitish patch on closed wing (coverts) almost masking the blackish brown flight feathers while bird at rest. Sides of head and neck greyish pink or vinous. *Below*, throat and neck white to buff. Upper breast ochre, of lanceolate feathers; lower breast blackish maroon. Rest of underparts white, the flanks ochre with faint dark shaft-lines.

Female. *Above*, chestnut-brown largely replacing black. A chestnut-brown shoulder patch. *Below*, chiefly chestnut and rufous, streaked with rufous-buff.

Young (immature). *Above*, dark brown with rufous scalloping or streaking. *Below*, chiefly white and buff, streaked with chestnut and buff.

STATUS, DISTRIBUTION and HABITAT. Resident: local, and apparently also locally migratory. West Pakistan (Sind), and northern India (Nepal, Uttar Pradesh), east to Assam (Cachar—Baker). Normally in the lowlands; in the vale of Kashmir up to c. 1500 to 1800 m. altitude. Frequents jheels and marshes with thick reed-beds and other cover.

EXTRALIMITAL. Central and southern Europe to W. Siberia and Transcaspia. Asia Minor, Israel, Iran, Turkestan, Afghanistan. N. Africa, wintering south to Cape Colony. Other races in tropical Africa, Australia, New Zealand.

GENERAL HABITS. Non-gregarious; usually keeping singly, rarely two or three together. Largely crepuscular. Skulks in thick reed-beds during daytime, clambering amongst the stems, and seldom shows itself except when flushed from its retreat. Flies with fairly rapid flaps of the rounded wings, head characteristically drawn into the shoulders, close above the water or reed tops to pitch into the growth again a short distance away preceded by a short glide. Sometimes seen standing hunchbacked at the edge of a reed-bed, lunging out with its bill now and again at some insect or other morsel. When suddenly come upon, especially when on nest, the bird 'freezes', stretching the flexible neck to its full length upwards, bill thrust stiffly into the sky. In this attitude the long slender neck blends so perfectly with the surrounding reeds, particularly in the case of the streaked female, that the bird becomes astonishingly invisible even at close range as long as it remains still.

VOICE AND CALLS. An occasional frog-like *wük* is recorded in Kashmir. In Europe the male has been described as uttering 'a rather low croaking *köök* repeated often for long stretches with remarkable regularity at rate of approximately 25 to a minute' (A. Voigt in Witherby 1939).

FOOD. Fish, frogs, molluscs, crustaceans, and largely insects.

BREEDING. Has been recorded in the Eastern Nara district of Sind (Doig and Butler) in May; in Kohat (Whitehead) in July; in Cachar (Baker — once) month not stated. Breeds commonly and abundantly in the Kashmir Valley from May to July; singly, not in colonies. *Nest*, a pad of rushes built partly by bending down a number of reeds and then adding other pieces of reed flags to form a shallow platform; from a few centimetres to a metre or so above the water. Normally in dense reed-beds and liable to be swamped by rise of water level in a flood. Sometimes the nests are made of fine twigs and provided with a depression for the eggs. *Eggs*, 4 to 6 or 7, white, often with a pale bluish tinge; regular ovals about equal at both ends, smooth but glossless. Average size of 80 eggs $34 \cdot 1 \times 26 \cdot 0$ mm. (Baker). Both sexes share in building the nest, incubation, and feeding the young. The eggs are laid at two-day intervals. Incubation period 16–17 days. Incubation commences with the first egg, resulting in marked disparity in the development of chicks of the same brood. The nestling is clothed in loose cinnamon-coloured down with longer bottlebrush-like bristles sticking out from its crown. The older chicks clamber about among the surrounding reeds till a parent returns with food, whereupon they scramble back to the nest where the characteristic tussle ensues to induce it to regurgitate.

MUSEUM DIAGNOSIS. For details of plumages etc. see Witherby 1939, 3: 154–5.

MEASUREMENTS

| | Wing | Bill (from feathers) | Tarsus | Tail |
|-----|-----------------------|-------------------------|--------|------------|
| ♂ ♂ | 142–155 | 45–52 | | |
| ♀ ♀ | 137–150 (once 157) | 45–52 | 42–47 | 45–52 mm. |
| | | | | (Witherby) |

Weight 2 oo? 105, 108 gm. (BNHS).

COLOURS OF BARE PARTS. Iris pale yellow to orange-yellow. Bill yellow, creamy yellow or purplish yellow, the culmen darker and browner. Orbital skin pale livid green. Legs and feet greenish yellow, dull greenish plumbeous or greenish horny (Baker).

56. Chestnut Bittern. *Ixobrychus cinnamomeus* (Gmelin)

Ardea cinnamomea Gmelin, 1789, Syst. Nat., 1(2): 643 (China)

Baker, FBI No. 2238, Vol. 6: 367

Plate 3, fig. 9, facing p. 48

LOCAL NAMES. *Löl bágla* (Hindi); *Khyri bák* or *Löl bák* (Bengal); *Meti kokka* (Sinhala); *Kurūtu kokku* (Tamil); *Sāndhya kokku* (Malayalam).

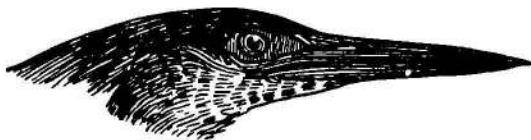
SIZE. Pond Heron—; length c. 38 cm. (15 in.).

FIELD CHARACTERS. Smaller and lankier than Pond Heron, but an unmistakable cousin.

Male (adult). *Above*, including crown and bushy crest, chestnut-cinnamon. Wing quills chestnut. *Below*, chin and throat whitish with a dark median stripe down foreneck. A patch of black and chestnut buff-edged feathers on each side of upper breast largely concealed by the elongated

breast feathers; rest of underparts pale chestnut. Underside of wings (in flight) still paler chestnut with a pinkish tinge.

Female (adult). *Above*, chestnut-brown. Crown blackish. Scapulars and wing-coverts with black-bordered buff spots. *Below*, buffy rufous with a heavy brown streak down middle of foreneck and breast, flanked by parallel broken lines on either side, like 'coarse stitching with brown thread'. Rest of underparts streaked with dark brown. Underwing rufous-buff.



$\times c. \frac{1}{4}$

Young (immature). Like female but less chestnut more brown above, and more distinctly barred and spotted. *Below*, more heavily streaked with dark brown.

STATUS, DISTRIBUTION and HABITAT. Resident — subject to local movements dependent on water conditions; possibly also migratory to some extent. Throughout the subcontinent, Ceylon, Andaman, Nicobar and Maldive islands. The Indus Valley is approximately the western limit of distribution of both this and Yellow Bittern; eastward to Assam and beyond. Lowlands from the Nepal duns and Himalayan terai southward in the Peninsula and Ceylon. Up to at least 900 m. elevation in the peninsular hills; to over 1800 m. in Ceylon. Affects reed-beds in inland jheels and swamps, inundated standing paddyfields, etc. Rarely also coastal backwaters and tidal mangroves, e.g. in Kerala; frequently side by side with the Yellow Bittern.

Extralimital. Burma, Thailand, Malaysia, Philippines, Sunda Islands, Celebes (Sulawesi). China from Manchuria to Hainan; Ryukyu Islands.

GENERAL HABITS. Non-gregarious and largely crepuscular. Normally seen during daytime only when flushed out of long grass, as when snipe-shooting, but commonly flying about from one reed patch to another during the breeding season and in overcast rainy weather. Flight (rather quick flaps of the rounded wings with neck drawn in) and other habits and behaviour very like Pond Heron and Yellow Bittern.

FOOD. Fish, frogs, molluscs, insects, etc. in astonishing quantity. One bird had swallowed a fish 12·70 cm. long, c. 5 cm. in circumference, with a skull c. 2 cm. across, 1 eel c. 13 cm. long, and 2 of c. 9 cm. each (Butler — Andamans).

VOICE and CALLS. Normally silent. Very noisy in spring, constantly uttering a loud *kok-kok* (La Touche). In courtship 'the male flew slowly before the female with slow, stiff wing beats, calling *ek-ek-ek*, then perched at the top of a low tree and sang *gook-gook-gook-gook-gook-gook-gook* with each of the first five notes louder than the one before it, and the last three pitched three or four tones lower' (H. G. Deignan). J. K. Stanford also describes this display in identical terms, minus the accompanying calls, and

says it reminded him of the nuptial flight of a longeared owl or a greenfinch (*vide* Smythies).

BREEDING. Season, between June and September, commencing as soon as the monsoon rains have well set in; most general in July-August. Nest, a small pad of leaves, bits of reed stem, etc. built on bent-down matted reeds, or in a cane brake in a swamp, a metre or so above the water or mud. Eggs, 4 or 5, sometimes 6, white with occasionally a bluish tint; short to long ovals, generally almost cylindrical. Average size of 50 eggs 36.5×26.4 mm. (Baker). Both sexes take part in building the nest, incubation, and feeding the young, which is done by regurgitation, as described under No. 36. Period of incubation undetermined.

MUSEUM DIAGNOSIS. Tibia naked for c. 10 mm. above tibio-tarsal joint; otherwise as for the genus (cf. *I. minutus*).

MEASUREMENTS

| | Wing | Bill (from feathers) | Tarsus | Tail |
|-----|------------|-------------------------|--------|----------------------|
| ♂ ♀ | 138-149 | 43-51 | 45-50 | 41-45 mm. (Baker) |
| | (once 156) | | | |

Recent specimens from Nepal measure:

| | Wing | Bill (from posterior edge of nostril) | Tail |
|-------|---------------|---|--------------------|
| 3 ♂ ♂ | 151, 152, 154 | 45, 46, 47 | 44, 46, 48 mm. |
| 1 ♀ | 145 | 45 | 45 mm. (Biswas) |

COLOURS OF BARE PARTS. Iris yellow, orange, or pinky red. Bill greenish yellow or light orange-yellow, the culmen blackish, and base of the mandibles rosy red. Naked orbital and loral skin deep rosy red or reddish purple in male; yellowish in female. Legs and feet yellowish green; soles paler, more yellow.

57. Yellow Bittern. *Ixobrychus sinensis* (Gmelin)

Ardea Sinensis Gmelin, 1789, Syst. Nat. 1(2): 642 (China)

Baker, FBI No. 2237, Vol. 6: 365

Plate 5, fig. 9, facing p. 96

LOCAL NAMES. *Jān bāglā* (Hindi); *Kat bāk* (Bengal); *Meti kokka* (Sinhala); *Mānāl nōrāi* (Tamil); *Manja kokku* (Malayalam).

SIZE. Same as Chestnut Bittern; length c. 38 cm. (15 in.).

FIELD CHARACTERS. Like the Chestnut Bittern, small and lanky, and an unmistakable cousin of the Pond Heron; predominantly yellow, brown, rufous, and chestnut. In flight yellowish fawn body contrasting with black wings suggestive of identity.

Male (adult). *Above*, crown and bushy crest black; sides of head vinous-pink. Back chiefly light brown or yellowish brown. Rump dark ashy; tail slaty black. Wing quills blackish. *Below*, chin, throat, and foreneck pale yellowish; upper breast blackish with buff streaks; rest of underparts pale yellowish buff.

Female. More or less similar except for a buff mesial line down the throat and foreneck, sometimes obsolescent.

Young (immature). *Above*, rufous-brown with broad buff fringes to the feathers (scalloping). *Below*, more heavily streaked; buff mesial line down centre of foreneck more pronounced.

STATUS, DISTRIBUTION and HABITAT. Resident, moving locally with water conditions; possibly also migratory to some extent. Throughout the subcontinent from the Indus Valley eastward to Assam and beyond, and from Nepal (duns) southward to Kerala. Also Ceylon, Andamans, and Nicobars. Lowlands, and up to c. 900 m. in the peninsular hills; to c. 1200 m. elevation in Ceylon. Affects reed-beds, and scrubby growth in inland swamps as well as coastal mangroves and backwaters, and inundated standing paddy crops, etc., frequently side by side with Chestnut Bittern.

Extralimital. Burma, Thailand, Malaya east to China and Japan, south to New Guinea and the Caroline Is. The numerous subspecies described are ill defined and their validity, according to Hartert (1910-22, 2: 1260) and later authorities, is questionable.

GENERAL HABITS. Like the Little Bittern (q.v.) largely crepuscular and nocturnal, but quite active in daytime in cloudy, overcast weather. When come upon suddenly, especially on nest, it also assumes the characteristic posture of the tribe aptly termed 'On Guard'. The slender neck is thrust vertically upward, bill pointing to the sky, while the bird freezes, taking full advantage of its streaked underside to become astonishingly inconspicuous amongst the reedy surroundings. In other respects also very similar to both the Little and the Chestnut Bitterns.

FOOD. Fish, frogs, molluscs, insects, etc. One described sitting on its heels catching flies 'which it did with incredibly rapid lunges of its head and bill without moving its body at all' (Vaughan & Jones — E. China).

VOICE and CALLS. Very silent. *Kaka-kakak* (Mayr — SW. Pacific).

BREEDING. *Season*, as in Chestnut Bittern, between June and September, as soon as the monsoon has properly set in, filling the depressions and swamps. *Nest*, and site, not different from the last — a pad of reed flags etc. placed on bent-down reeds in a swamp, or in shrubbery on the edge of a pond, from a few centimetres to a metre or so above the water or mud. *Eggs*, 4 to 6, fine-textured but glossless, pale skim-milk blue or green-blue. Inner membrane pale blue *contra* white or pale yellowish white in *Ixobrychus minutus*. Average size of 60 eggs 31.2 × 23.9 mm. (Baker). Both sexes take part in all the domestic chores. The eggs are laid on consecutive days and incubation begins from the first egg. Period of incubation undetermined.

MUSEUM DIAGNOSIS. For fuller description of plumage see Baker, loc. cit.

Tibia feathered down to the tibio-tarsal joint. Culmen longer than mid-toe and claw. Rest as for the genus.

MEASUREMENTS

| | Wing | Bill (from feathers) | Tarsus | Tail |
|-----|-----------------------|-------------------------|--------|----------------------|
| ♂ ♀ | 129-136 (once 143) | 52-57 (once 49) | 44-51 | 41-47 mm. (Baker) |

COLOURS OF BARE PARTS. Iris orange-yellow or bright golden yellow. Bill: culmen horny brown, commissure and lower mandible pale yellowish flesh; mouth

pink. Naked facial skin pale greenish yellow. Legs and feet yellow or greenish yellow; claws horny brown.

58. Black Bittern. *Ixobrychus flavicollis* (Latham)

Ardea flavicollis Latham, 1790, Index Orn., 2: 701 (India)

Baker, FBI No. 2239, Vol. 6: 368

Plate 3, fig. 8, facing p. 48 and Plate 7, fig. 2, facing p. 144

LOCAL NAMES. *Kälä bđglā* (Hindi); *Kälō bđk* (Bengal); *Ay jan* (Assam); *Khaira bđg* (Assam, Nowgong); *Kalu kôkka* (Sinhala); *Kârappu nârâi* (Tamil); *Kârûtha kôkku* (Malayalam).

SIZE. Pond Heron +; length c. 58 cm. (23 in.).

FIELD CHARACTERS. General effect as of Pond Heron; largely black and rufous-buff with a conspicuous buff-and-white cheek patch.

Male (adult). *Above*, crown, sides of head, and upperparts including wings and tail, slaty grey to almost black. A band of bright ochre-yellow on either side of neck. *Below*, chin and throat white with a rufous dotted line down the middle. Foreneck mixed slaty black, chestnut, and buff. Upper breast dark slate with buffy white margins to the feathers (scalloping). Rest of underparts slaty grey to brownish black with a few white-edged feathers on abdomen.

Female (adult). *Above*, more brown less slaty grey. *Below*, breast feathers streaked with white and rufous markings. Abdomen lighter brown with more white in centre.

Young (immature). *Above*, crown slaty black; rest of upper plumage including wings, dark brown scalloped light rufous. *Below*, upper breast brownish rufous, scalloped paler and with darker shaft-streaks.

STATUS, DISTRIBUTION and HABITAT. Resident, shifting locally with water conditions. Also partly migratory. Thinly and patchily distributed throughout the better watered parts of the subcontinent, from Sind in West Pakistan (E. Nara district) and the Gangetic Plain including Bengal and East Pakistan, to Assam, Manipur and beyond. Fairly common in the heavy rainfall zone of south-west India (Mysore, Kerala), and Ceylon. Not recorded from the Andaman and Nicobar islands. Affects reedy inland swamps and overgrown seepage nullahs in jungle, mostly in the low country, but also suitable marshes up to c. 1200 metres in the hills. Apparently not found in tidal mangroves.

Extralimital. Burma, Thailand, Malaysia, Indochina, central and southern China, Greater Sunda Is., Celebes (Sulawesi). Other races extend the species to Australia.

MIGRATION. A bird ringed in Malaya (Selangor, 3°12'N., 101°04'E.) 11.xii.1964 recovered in Manipur (Tadubi, 25°34'N., 94°04'E.) 1.xi.1965 (*Malayan Nature Jour.* 21(1): 36)

GENERAL HABITS. Non-gregarious; largely crepuscular and nocturnal. On the whole very similar to those of the genus *Ixobrychus*. Skulks in swampy reed-beds and thickets once the sun is up, and only seen in daytime when beaten out of its retreat; more active at dawn and dusk, and in overcast rainy weather. Flight characteristic of the little herons as described. When suddenly come upon, adults as well as flightless clambering young assume the 'On Guard' posture and freeze, effectively camouflaging themselves among the reed stems.

FOOD. Fish, frogs, molluscs, insects, etc. (One fish c. 115 cm. taken from stomach.)

VOICE AND CALLS. Unrecorded, except for a loud booming in the breeding season.

BREEDING. *Season*, mainly June to September during the SW. monsoon, varying locally with incidence of rainfall and filling up of jheels and swamps. *Nest*, a pad of twigs or matted water-weeds with a slight central depression. Placed on bent-down reeds in a swamp, or in a cane brake or bamboo clump, a metre or so above the surface. *Eggs*, normally 4, broad ovals more or less equal at both ends, white with a faint tinge of bluish or sea green. Average size of 40 eggs $41 \cdot 6 \times 31 \cdot 4$ mm. (Baker). Both sexes share all the domestic chores. Incubation starts with the first egg. Incubation period undetermined. Chicks fed by regurgitation as characteristic of the family.

MUSEUM DIAGNOSIS

MEASUREMENTS

| | Wing | Bill (from feathers) | Tarsus | Tail |
|-----|---------|-------------------------|--------|-----------|
| ♂ ♂ | 197-215 | 69-82 | 61-70 | 63-74 mm. |
| ♀ ♀ | 196-204 | | | |

COLOURS OF BARE PARTS. Iris golden brown to red. Bill reddish horny, paler and yellowish at tip and terminal half of lower mandible; bare facial skin purple, the eyelids bluer. Legs and feet dark brown (Baker).

Genus *BOTAURUS* Stephens

Botaurus Stephens, 1819, in Shaw, Gen. Zool. 11(2): 592. Type, by subsequent designation, *Ardea stellaris* Linnaeus

Plumage long and lax forming decorative plumes down foreneck and breast. Bill, short, deep at base, much compressed. Culmen shorter than tarsus. Nasal groove broad and deep with the linear nostril near base. Tarsus stout and short, shorter than middle toe and claw. Tibia partly naked above joint. Tail of ten feathers.

Genus chiefly confined to Palearctic, Oriental and Australian regions, one species being found in India.

59. *Bittern*, *Botaurus stellaris stellaris* (Linnaeus)

Ardea stellaris Linnaeus, 1758, Syst. Nat., ed. 10, 1: 144
(Europe, restricted to Sweden)

Baker, FBI No. 2240, Vol. 6: 370
Plate 5, fig. 4, facing p. 96

LOCAL NAMES. *Nir gong, Bâz* (Hindi).

SIZE. Pond Heron +; length c. 71 cm. (28 in.).

FIELD CHARACTERS. Considerably larger than the Pond Heron, but of the same general hunchbacked effect, with neck retracted, both at rest and in flight. Overall tawny buff or straw colour, closely barred and mottled with blackish. Short, stout, pointed bill, and large feet.

Adult. *Above*, crown, nape and upper back black; bushy drooping crest partly tipped and edged with buff. Sides of head ochre, faintly stippled with black. Lower back, rump, and tail yellowish buff, profusely barred and mottled with black. *Below*, chin and throat white with a conspicuous buff and black median line continued down elongated overhanging yellowish buff breast plumes. Rest of underparts yellowish buff, streaked with brown and buff. Sides of breast narrowly barred with brown and dark buff. Sexes alike.



x c. 1

STATUS, DISTRIBUTION and HABITAT. Winter visitor, found in small numbers from Sind in West Pakistan (common) across Rajasthan and the Gangetic Plain to Assam, straggling south through Gujarat, Madhya Pradesh, Orissa, Andhra Pradesh, Maharashtra, Madras and Mysore (Nanjangud, 160 km. south of Bangalore, being the southernmost record in India). Not recorded in Kerala or Ceylon. Affects dense reed-beds and bulrushes in inland jheels and swamps.

Extralimital. Breeds in the temperate Palaearctic region throughout Europe and Asia from Great Britain to Japan. A second breeding race in South Africa.

MIGRATION. No precise information.

GENERAL HABITS. Similar to its smaller cousins described. Solitary, secretive, crepuscular and nocturnal. Seldom seen in daytime except when put up from partly submerged reed-beds, e.g. while snipe-shooting is in progress. Flaps leisurely and noiselessly above the reeds on its broad rounded wings and pitches into cover again a short distance away. When nesting, has the characteristic habit of freezing on alarm, neck and bill stretched vertically upward. In its winter quarters this 'On Guard' posture is only seen when e.g. a wounded bird is trying to evade capture.

FOOD. Fish, frogs, molluscs, insects, etc. Elsewhere small birds and rodents also recorded.

VOICE and CALLS. Silent in winter. In breeding season the male utters a deep, resonant, rather ventriloquial *boom*, commonly repeated 3 to 6 times

or more. It is not particularly loud but of great carrying power and audible over a mile away.

BREEDING. Not proven but may possibly breed in thick reed-beds in Anchar Lake in the Kashmir Valley as asserted by local shikaris. According to Bates & Lowther 1952 (p. 355) it may occasionally be heard *booming* there in June, which is suggestive circumstantial evidence. *Nest* and site similar to those of the smaller bitterns. *Eggs*, 4 to 6, light olive-brown with a few specks and spots of darker brown at the broad end. Average size of 80 eggs 52.5×38.3 (Baker).

MUSEUM DIAGNOSIS. For description of plumages etc. see Witherby 1939, 3: 159-60.

MEASUREMENTS

| | Wing | Bill | Tarsus | Tail |
|-----|---------|-------|--------|------------|
| ♂ ♂ | 320-350 | 60-75 | 90-100 | 95-116 mm. |
| ♀ ♀ | 300-350 | 65-75 | — | — |

(Witherby)

COLOURS OF BARE PARTS. Iris yellow. Bill greenish yellow, ridge of upper mandible brown at base, black-brown at tip. Lores and round eyes green to 'livid blue'. Legs and feet pale green, yellowish at tarsal joint and back of tarsus; soles yellow (Witherby).

MISCELLANEOUS. Longevity 8+ years (Ring, 1962, 33: 148).

Family CICONIIDAE. Storks

Large, long-legged, diurnal birds chiefly terrestrial and marsh-haunting. Colour pattern mainly white and black with a metallic sheen. Bill long, massive, pointed, straight or nearly so, ungrooved. Wings long and broad. Tail short; under tail-coverts lax and greatly developed in some species. Legs very long, the tibiae partly naked. Toes of moderate length, webbed at base. Claws blunt, that of middle toe not pectinated as in herons. No powder-down 'shampoo' patches. Tracheo-bronchial muscles to the syrinx or 'sound box' absent, therefore lacking voice and calls. Most species produce low grunting and hissing noises, and a loud castanet-like clattering or snapping of the mandibles.

Unlike herons, storks fly with neck and legs fully outstretched like cranes, ibises and spoonbills, by a series of wing flaps interspersed with sailing.

RANGE. Temperate and tropical zones of the Old and New Worlds. Seventeen species in all, the northern ones migratory.

FOOD. Mainly small animals — mammals, birds, reptiles, amphibians, fish, crustaceans, insects, etc.

BREEDING. *Nests*, large stick platforms in trees, or on cliffs and buildings. *Eggs*, 3-6 white. Incubation and nest feeding by both sexes. Chicks nidicolous; naked at first, downy later. Food regurgitated by parent into nest, whence guzzled by nestlings.

For structural and morphological details see Baker 1929, 6: 320; Witherby *et al.* 1939, 3: 112; Stresemann 1927-34, Aves: 807-9. Cf. Kahl, P., 1971, *Living Bird* (Cornell Univ.) 10: 151-70; 1970 JBNHS 67: 453-71.

Key to the Indian forms

- A Mandibles with edges not touching, leaving open gap near centre of bill 1

Page

| | | Page |
|---|---|--|
| I | Primaries, secondaries, scapulars, and tail black, rest of plumage white..... <i>Anastomus oscitans</i> (breeding) | 95 |
| | Primaries, secondaries, scapulars, and tail black, rest of plumage grey..... <i>Anastomus oscitans</i> (non-breeding) | 95 |
| B | Mandibles touching | 2 |
| 2 | Bill straight, head and neck unfeathered, prominent gular pouch, wing over 75 cm. (c. 30 in.)..... | a |
| | Bill straight, head and neck unfeathered, gular pouch absent, wing under 70 cm. (c. 28 in.)..... | b |
| | Bill straight, head and neck generally feathered..... | c |
| | Bill slightly upcurved at end, head feathered..... | d |
| | Bill downcurved, head naked..... | e |
| a | Upperparts, including wings, slaty grey. Silvery grey stripe across wings | <i>Leptoptilos dubius</i> (breeding) 105 |
| | Silvery grey stripe absent..... | <i>Leptoptilos dubius</i> (non-breeding) 105 |
| | Upperparts blackish brown..... | <i>Leptoptilos dubius</i> (juvenile) 105 |
| b | Upperparts glossy black, copper spots on secondary coverts..... | <i>Leptoptilos javanicus</i> (breeding) 107 |
| | Copper spots lacking..... | <i>Leptoptilos javanicus</i> (non-breeding) 107 |
| | Plumage dull black above, head and neck with patches of feathers | <i>Leptoptilos javanicus</i> (juvenile) 107 |
| c | Plumage white, scapulars and wing quills black..... | <i>Ciconia ciconia</i> (adult) 99, 102 |
| | Black of wings replaced with brown..... | <i>Ciconia ciconia</i> (juvenile) 99, 102 |
| | Neck white, back and wings glossy black..... | <i>Ciconia episcopus</i> (adult) 98 |
| | Glossy black replaced by dull, dark brown..... | <i>Ciconia episcopus</i> (juvenile) 98 |
| d | Plumage black with white underparts (standing c. 106 cm. = 3½ ft.)..... | <i>Ciconia nigra</i> (adult) 102 |
| | Neck brown, back dull blackish brown, underparts white..... | <i>Ciconia nigra</i> (juvenile) 102 |
| | Head, neck, and scapulars iridescent black, remainder of plumage white (standing c. 135 cm. = 4½ ft.) | <i>Ephippiorhynchus asiaticus</i> (adult) 104 |
| | Black of head, neck, and scapulars replaced by dusky brown.... | <i>Ephippiorhynchus asiaticus</i> (juvenile) 104 |
| e | Neck white | <i>Mycteria leucocephala</i> (adult) 93 |
| | Neck brown | <i>Mycteria leucocephala</i> (juvenile) 93 |

Genus *MYCTERIA* Linnaeus*Mycteria* Linnaeus, 1758, Syst. Nat., ed. 10, 1: 140Type, by monotypy, *Mycteria americana* Linnaeus

Bill long, and very slightly compressed, broad at the base. Culmen rounded throughout; slightly turned downwards throughout its length; lower mandible concave beneath. Both mandibles subcylindrical anteriorly. Nostrils oval, placed near base of culmen. Head and throat naked; nape and neck feathered. Legs long with tibia half naked; toes long. Under tail-coverts very long, extending beyond tail. Represented in our area by only one species.

60. Painted Stork. *Mycteria leucocephala* (Pennant)*Tantalus leucocephalus* Pennant, 1769, Indian Zool.: 11, pl. 10 (Ceylon)

Baker, FBI No. 2214, Vol. 6: 331

Plate 2, fig. 4, facing p. 32

LOCAL NAMES. *Jānghil, Dhōk* (Hindi); *Kānkāri* (Mirshikars, Bihar); *Jānghil, Rāmjhāṅkar, Sona jāṅgha* (Bengal); *Lamjang, Lungduk* (Sind); *Chitrōda* (Kutch); *Yeru kālā konga* (Telugu); *Chēṅgā nārāi* (Tamil); *Sāṅguvālai nārāi* (Tamil, Ceylon); *Das tuduwa* (Sinhala).

SIZE. Vulture ±; standing c. 93 cm. (3½ ft.).

FIELD CHARACTERS. A long-legged, long-necked, egret-like marsh bird with long, heavy yellow bill slightly decurved at tip, and unfeathered waxy yellow face. Plumage white, closely barred with metallic greenish black above, with a black band across breast. Delicate rose-pink near the tail (closed inner secondaries). Wing- and tail-quills black. Sexes alike.

Flight silhouette somewhat hunchbacked, neck outstretched (head lower than line of back) and long legs trailing straight behind.

Young (immature). Pale brown with dark scale-like edges to the neck feathers. No pectoral band.

STATUS, DISTRIBUTION and HABITAT. Resident, shifting locally with water conditions. Throughout the plains of the Indian Union, both Pakistans, Nepal terai, Ceylon (low country dry zone). Not recorded in the Andaman Is. Affects inland marshes, jheels, inundated fields, and occasionally river banks.

Extralimital. Burma, Thailand, N. Malaya (vagrant), Indochina, SW. China.

GENERAL HABITS. Normally met with in pairs or small parties. In the breeding season enormous congregations of up to several thousand strong may collect at favourite heronries, e.g. Keoladeo Ghana in Rajasthan. Such heronries tend to become traditional if left unmolested. The birds feed gregariously where food is abundant, such as when large quantities of fish are washed down by monsoon floods. Usually they hunt individually, wading into shallow water with neck bent down, mandibles open like an enormous pair of forceps and partly immersed, probing the bottom mud. The bird saunters about slowly ploughing the water thus. From time to time one leg is partly flexed and deliberately waggled back and forth in a raking motion, occasionally supplemented by a sudden flicking open of the wing on the same side. This manoeuvre is obviously intended for stampeding 'frozen' quarry towards the open mandibles. Its success is evident from the snapping and swallowing action that frequently follows. When sated, the birds spend their time standing about hunchbacked on the bank, or soaring on thermals for hours on end, circling aloft on motionless wings in company with pelicans and other stork-like birds. Normal flight typical of the family (q.v.), accompanied by a rhythmical slight opening and closing of bill as if gasping for breath.

FOOD. Mainly fish. Also reptiles, frogs, crustaceans, and insects.

VOICE and CALLS. Silent except for the characteristic clattering of the mandibles of the family. During greeting ceremony at nest a low moan

produced by both (?) sexes. A continuous harsh grating or scraping noise by half-grown nestlings when begging food.

BREEDING. Colonial, sometimes several thousand pairs together in mixed heronries. *Season*, variable, dependent on monsoon conditions. Normally August to October in N. India; November to March in the south; March-April in Ceylon. In drought years breeding may be skipped altogether. *Nest*, a large stick platform with a shallow central depression sparsely lined with leaves, straw, and waterweeds; added to desultorily throughout occupation with leafy twigs or green water vines (e.g. *Ipomoea*). Built in large or medium sized trees standing in water, such as babool (*Acacia arabica*), kändi (*Prosopis spicigera*), kelikädämb (*Stephegyne parviflora*) and *Barringtonia racemosa*, often twenty nests or more on a single tree crowded cheek by jowl in disorderly tiers, in amicable association with cormorants, darters, open-bill storks, and others. Not uncommonly also on single large peepul (*Ficus religiosa*) or suchlike trees overhanging a pond within a populated town. *Eggs*, 2 to 5 — most commonly 3 or 4 — dull sullied white, sometimes sparsely spotted and streaked with brown. Average size of 50 eggs 69.5×49.0 mm. (Baker). Both sexes share all the domestic chores. Period of incubation undetermined. Adult, on arrival at nest, greets incubating mate by craning forward and stiffly arching neck (as in aggressive vulture at a carcase), with bill partly open as if about to be sick! This gesture reciprocated by mate in the same way, both (?) birds uttering a low moan during the ceremony, sometimes crossing the stiffly arched necks the while. In nest relief the incoming bird is greeted by its incubating mate standing up on the edge of the nest, both birds ruffling their long, lax, under tail-coverts, bending their heads together down into the nest, shifting from one foot to the other, and making as if to adjust the twigs in the structure before the newcomer takes over. While one bird is brooding its mate often flies out, maybe half a kilometre or more, to fetch tender leafy babool branches to add to the nest. Twigs wrenched off topmost branches with much effort, and sections of floating *Ipomoea* vine collected from the water — sometimes absurdly large bushy branches, at others ridiculously tiny or scraggy leafless twigs or rush-blades. Twigs broken off tops of only certain individual trees to which many birds from the neighbourhood may resort, several tugging at the same time. When the forager returns with material, the sitting bird greets him (or her) with clattering of mandibles, bill-touching and tail-spreading.

In the pre-clambering stage, small nestlings very intolerant of hot sun; constantly shielded by parent standing on edge of nest with partly open, drooping wings. On fright they disgorge all undigested food and feign death in a realistic manner, crumpling up pathetically on the floor of the nest. Three-quarter-grown chicks clamber about the neighbouring branches. On return of foraging parent they quickly scramble back to the nest and beg with open bills and partly open flapping wings, bobbing or 'pumping' head up and down with a continuous rasping or scraping cry, rather as of vultures in copulation. Sometimes incoming parent sits inert for long periods beside the nest (in one case 45 minutes) before stepping on to the edge and disgorging 6 to 8 large fish, along with much slimy matter. The chicks gobble these up from the nest floor, the more impatient ones poking their

bills into the parent's gullet and tugging at the fish to speed it on its way. Possibly the delay in delivery is due to the necessity of predigesting the food for the young.

MUSEUM DIAGNOSIS. Chick (in down). Sullied white with naked black face and black bill tipped with pale greenish yellow or sulphur yellow, more extensively on upper mandible. Also yellow on short thick (naked) eyebrow, at anterior end of eye and along naked hindneck.

MEASUREMENTS

| | Wing | Bill (from feathers) | Tarsus | Tail |
|----|---------|-------------------------|---------|------------------------|
| ♂♀ | 490-510 | 252-278 | 240-250 | 150-172 mm. (Baker) |

Weight 2 oo? 2020, 3500 gm. (BNHS).

COLOURS OF BARE PARTS. Iris straw yellow; grey-brown in immature. Bill orange-yellow, darker and plumbeous at base; naked skin of face orange-yellow. Legs and feet brown or fleshy brown, sometimes nearly red.

Genus *ANASTOMUS* Bonnaterre

Anastomus Bonnaterre, 1791, Tabl. Encyc. Méth. Orn., 1: xciii. Type, by subsequent designation, *Ardea oscitans* Boddaert

Bill stout and strong; gonys considerably upcurved; an open space between the mandibles for about two-thirds their length in the middle. Anterior half of upper mandible furnished with lamellae. Face, chin, and throat naked in adults; feathered all but the lores and throat in juveniles. Tarsus about equal to culmen in length; reticulated throughout. Toes and claws longer than in other genera of Ciconiidae.

61. Openbill Stork. *Anastomus oscitans* (Boddaert)

Ardea oscitans Boddaert, 1783, Table Pl. enlum.: 55 (Pondicherry)

Baker, FBI No. 2215, Vol. 6: 333

Plate 2, fig. 7, facing p. 32

LOCAL NAMES. *Günglä*, *Ghungil*, *Ghonghila* (Hindi); *Dokar* (Bihar); *Thonte bhāṅga*. *Shāmūkh bhāṅga*, *Shāmūkh khol* (Bengal); *Pouna konga* (Southern Gonds); *Galu konga* (Telugu); *Naththai kuththi nārdi* (Tamil); *Gombelle kōkka*, *Bellan kōkka*, *Beli kava* (Sinhala); *Sāmūk bhāṅga* ('snail breaker'. Assamese, Nowgong); *Cherakokkan* (Malayalam).

SIZE. Large duck; length c. 81 cm. (32 in.). Standing c. 68 cm. (2½ ft.) to top of head.

FIELD CHARACTERS. A small stork, chiefly white with glistening purplish black or greenish black mantle (scapulars), wings, and tail. The peculiar-shaped bill with arching mandibles, leaving a narrow open gap between them, is diagnostic. Casually mistakable in the distance for White Stork, *Ciconia ciconia* (q.v.). Sexes alike.

In non-breeding plumage white upper parts replaced by dull smoky grey.

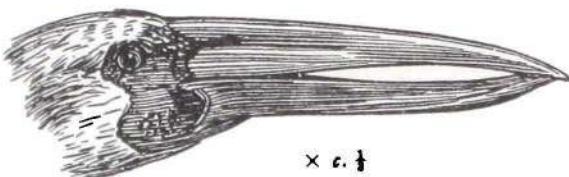
Young (immature). Darker smoky brown-grey with blackish brown mantle.

STATUS, DISTRIBUTION and HABITAT. Resident, shifting locally with water conditions. Possibly regular local migrant in parts (?). Throughout

the Indian Union, both Pakistans, Nepal (terai), and Ceylon. Affects inland waters — jheels, marshes, etc.; rarely river banks, and tidal mud flats.

Extralimital. Burma, Thailand, east through the Indochinese subregion.

MIGRATION. Apart from local shifts directly influenced by water conditions, performs some sort of regular migratory movement, as yet little understood. Birds are constantly reported dashing themselves against the dome of the lantern at various coastal lighthouses, e.g. Point Calimere (Tanjavur dist., Madras) and Sacramento (E. Godavari dist., Andhra).



This occurs only during the later monsoon months (August-September) on particular nights in the dark period of the moon, in overcast weather with low clouds, poor visibility and heavy wind. The falls occur before midnight or in the very early dark hours of morning, when a sedentary diurnal bird as this should normally have no business to be about!

Nestlings ringed at Bharatpur (Rajasthan) have been recovered a few months later up to 800 km. due east, suggesting definite seasonal movement. Further evidence of long migration provided by a bird ringed in Thailand (Wat Phailom, 14°06' N., 100°33' E.) on 5.ii.1965, recovered in East Pakistan (Jessore 23°20' N., 89°20' E.) on 26.vi.1966—a straight line distance of c. 1500 km. It is possible that after leaving the nest the young of this stork also disperse and wander far and wide, as young Grey Herons are well known to do.

GENERAL HABITS. Our smallest and commonest stork, with a wide local distribution. Met with singly or in small parties and flocks; large congregations when nesting. Like others of the family, regularly soars on thermals on a sunny day, circling for hours high up in the heavens in company with pelicans, ibises, and vultures, etc. The descent from aloft is a spectacular performance. With erect neck, head held high (cocked), wings half pulled in, the dangling legs partly flexed and straddled to balance—sometimes worked back and forth as in running—the bird hurtles steeply through space, banking, side-slipping, and gyrating violently, till within a few short seconds, from a mere speck in the sky, it has swished down to alight buoyantly on a tree-top in the colony, preceded by a vigorous braking with the wings.

The significance and function of the peculiar gap in the bill is obscure. It is not meant for crushing snail shells as sometimes suggested. However, it is obviously an adaptation to facilitate extraction of the soft body and viscera of molluscs from the shell, particularly of the large *Pila globosa* snails on which the bird commonly feeds. The precise mechanics of the process have not been observed. In captivity Jerdon (1862-4) records that even blinded Openbills secured the shell with their feet and after some manipulation 'succeeded in cutting off the operculum as cleanly as if it had been done by a razor', but so rapidly that he was unable to follow the details. After removing the operculum the bird inserted the tip of its



PLATE 5

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 1964.

mandibles and 'pulled out the entire shell fish almost to its utmost tip'. Examination of *Pila* shells immediately after they had been emptied by Openbills showed that pressure exerted by the mandibles on the thin and brittle rim of the mouth had cracked off a section of it, allowing the bill tip to be inserted below the operculum to prise it up. How the soft parts are extracted so cleanly and rapidly remains a puzzle. The shells are often tackled under water with the mandibles of the bird partly open and submerged to above the eyes. The rapidity with which the bill is raised again and again to swallow the morsels is quite amazing. Before withdrawing, the head is shaken from side to side in the water as if to wash off the mud from the food.

FOOD. Chiefly molluscs. From the bill and gullet of a specimen eight complete bodies and viscera of large *Pila globosa* snails have been taken. Also eats crabs, frogs, and other small animals found on its accustomed feeding marshes. For details of food in the Sunderbans see Mukherjee, A. K., 1974, JBNHS 71(2): 188-91.

VOICE AND CALLS. Very silent except for occasional deep moans and clattering of mandibles during greeting ceremony at nest. During copulation ♂ clatters his bill against that of ♀ (M. P. Kahl).

BREEDING. Colonial, in large mixed heronries sometimes several thousand pairs (e.g. at Keoladeo Ghana, Rajasthan). Season, mainly July to September in north India; November to March in the south; December to April in Ceylon; dependent on monsoon and water conditions. In drought years breeding may be skipped altogether. Nest, a rough circular pad of twigs with a central depression lined with leaves, etc. Built in trees such as *Acacia*, *Prosopis*, or *Barringtonia*, standing partially submerged in a jheel or monsoon-filled depression. Occasionally on the edge of a tank, in or close to a village. Many nests (up to 30 or more) on a single tree, in crowded association with darters, cormorants, and egrets with a tendency to segregation. Nests in such crowded situations become thickly caked with chalky white excreta from the jostling occupants of adjacent nests. Eggs, 2 to 4, rarely 5, sullied white, broad to moderate ovals, with a close texture. Average size of 100 eggs 57.9 × 41.2 mm. (Baker). Both sexes partake in all the domestic chores. Period of incubation believed to be 24-5 days; not confirmed. Chicks clothed in pale fawn-coloured down. Intolerant of the hot sun, and constantly shielded by parents standing on edge of nest with open drooping wings.

Fed by regurgitation by parent on to floor of nest, almost exclusively on soft bodies and viscera of large snails. Importunate chicks often short-circuit the food from the parent's open bill during the disgorgement process. On fright they throw up large boluses of it (once c. 58 gm.).

Till young flies from nest, bill of normal shape with close fitting mandibles; subsequent development of gap needs study. For further notes see Kahl, M. P., 1970, JBNHS 67(3): 454-6.

MUSEUM DIAGNOSIS

MEASUREMENTS

| | Wing | Bill (from feathers) | Tarsus | Tail |
|-----|---------|-------------------------|------------|------------------------|
| ♂ ♀ | 392-408 | 153-162 | c. 140-150 | 183-217 mm. (Baker) |

COLOURS OF BARE PARTS. Adult. Iris almost white, grey, or pale brown. Bill dull greenish horny, redder beneath; or dusky red. Orbital skin and naked lores black. Legs and feet dull fleshy. Grown nestling. Iris greyish brown. Bill dark brown; gular skin bright purple. Legs and feet greyish- or pinkish brown.

Genus CICONIA Brisson

Ciconia Brisson, 1760, Orn., 1: 48, 5: 361. Type, by tautonymy, *Ciconia* = *Ardea* *Ciconia* Linnaeus

Bill long, stout, tapering, and pointed, the lower mandible slightly inclined upwards anteriorly. Nostrils almost linear, basal, and pervious. Part of lores, and chin, naked. Lower half of tibia naked. Tarsi long and reticulated. Feet short with broad toes; claws very short, broad, and depressed. Feathers of lower neck elongated, partly overhanging breast. For further structural details see Witherby 1939, 3: 115.

62. Whitenecked Stork. *Ciconia episcopus episcopus* (Boddaert)

Ardea episcopus Boddaert, 1783, Table Pl. enlum.: 54 (Coromandel Coast)

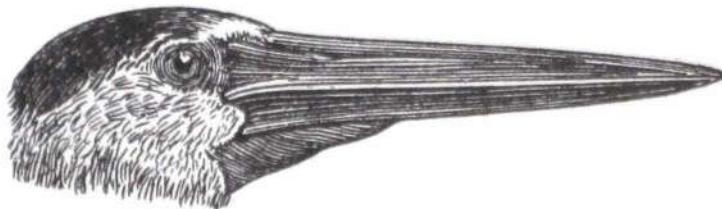
Baker, FBI No. 2210, Vol. 6: 342

Plate 2, fig. 8, facing p. 32

LOCAL NAMES. *Mänik jor* (Bengal); *Lägläg* (Hindi); *Bägula, Kärdök, Kandesur, Kowrow* (Marathi); *Kali tul* (Gujarat); *Vännäthi năräi* (Tamil); *Kanua* (Assam); *Kärim kökku* (Malayalam); *Padili kokka* (Sinhala).

SIZE. Goose ±; standing c. 106 cm. (3½ ft.) to top of head.

FIELD CHARACTERS. A red-legged black and white stork with conspicuous white neck and black crown (like a padre's skull-cap). Rest of plumage including short tail black glossed with purple or greenish blue, except elongated under tail-coverts which are white. Sexes alike.



× c. ½

Young (immature). The glossy black replaced by dull dark brown, but sometimes as in adult. Feathers of neck longer and more fluffy. (For description of nestling c. 1 week old, see Whistler JBNHS 25: 746.)

STATUS, DISTRIBUTION and HABITAT. Resident. Sparsely distributed throughout the well watered parts of India, both Pakistans, Nepal (to c. 1250 m. elevation), Ceylon. Locally not uncommon. Low country, plateaux, and up to at least c. 650 m. in the peninsular hills in suitable biotope. Affects flooded grassland and fallows, irrigated ploughed fields, rain-filled puddles and depressions, banks of streams, seepage marshes, etc. Often deep in forest where marshes occur. Rarely on tidal creeks, and only far up from the sea.

Extralimital. Burma. Other races in Africa and SE. Asia.

GENERAL HABITS. Met with as a solitary, in pairs, or small parties — a flock of fifteen being the largest ever recorded by us (SA). Stalks about and feeds on dry or marshy land, seldom wading in water or immersing bill. Roosts at night in tall trees. Has the common habit of soaring on thermals on a sunny day and gliding in circles high up in the sky in company with related birds, and with vultures. For further notes see Kahl, M. P., 1970, JBNHS 67(3): 456–7.

FOOD. Frogs, reptiles, crabs, molluscs, and large insects. Fish only when stranded high and dry by receding flood, or from drying up water-holes in forest streams, etc. Has been observed to pick winged termites emerging from the ground and also in the air, flying back and forth through a rising swarm and snapping up the insects in the bill (Ball 1874, SF2: 433).

VOICE and CALLS. Silent except for a clattering of the mandibles with neck bent over backwards and crown resting between the shoulders.

BREEDING. Individual; not in colonies. *Season*, variable; mostly July to September in northern India; December to March in the south; January to April in Ceylon. *Nest*, a massive structure of twigs, c. 1 metre in diameter, with a considerable central depression lined with straw, almost deep enough to hide the bird when sitting close. Usually built in a lofty tree such as *Salmalia* some 20 to 30 metres from the ground. Sometimes also lower down in medium sized trees. The same site may be used in subsequent years if the birds are left undisturbed. *Eggs*, broad to pointed ovals, 3 or 4, rarely 5, white, but becoming stained brown during incubation through contact with the bird's muddy feet. Very variable in size and shape. Average size of 100 eggs 62.9×47.4 mm. (Baker). Both sexes take part in building the nest and feeding the young; presumably also in incubation (unconfirmed). Period of incubation unrecorded. Young fed by regurgitation of predigested food by parent into nest, as in other storks.

MUSEUM DIAGNOSIS. Forehead, sides of head to behind the eye naked. Tail (black) short and deeply forked. Under tail-coverts (white), longer than tail and with stiff shafts, giving the impression of being the true tail.

MEASUREMENTS

| | Wing | Bill | Tarsus | Tail |
|-----|---------|----------------------------|------------|------------------------|
| ♂ 9 | 444 497 | 145–168 (from feathers) | c. 152–180 | 199–255 mm. (Baker) |

Two males collected by SA recently have wings 515–519 mm., showing the wide diversity in the range.

COLOURS OF BARE PARTS. Iris brown. Bill black, red on culmen, gonys, along the commissure, and at tips of both mandibles. Naked skin of face, chin, and throat slate black. Legs and feet red lake.

63. White Stork. *Ciconia ciconia ciconia* (Linnaeus)

Ardea Ciconia Linnaeus, 1758, Syst. Nat., ed. 10, I: 142 (Sweden)

Baker FBI No. 2207, Vol. 6: 321

Plate 6, fig. 2, facing p. 112

LOCAL NAMES. *Ldgldg, Hāji klgldg, Ujli, Dhak, Gybir, Bödd rētwā* (Hindi); *Wadumi konga* (Telugu); *Ldklāk* (Sind).

SIZE. Goose ±; standing c. 106 cm. ($3\frac{1}{2}$ ft.) to top of head.

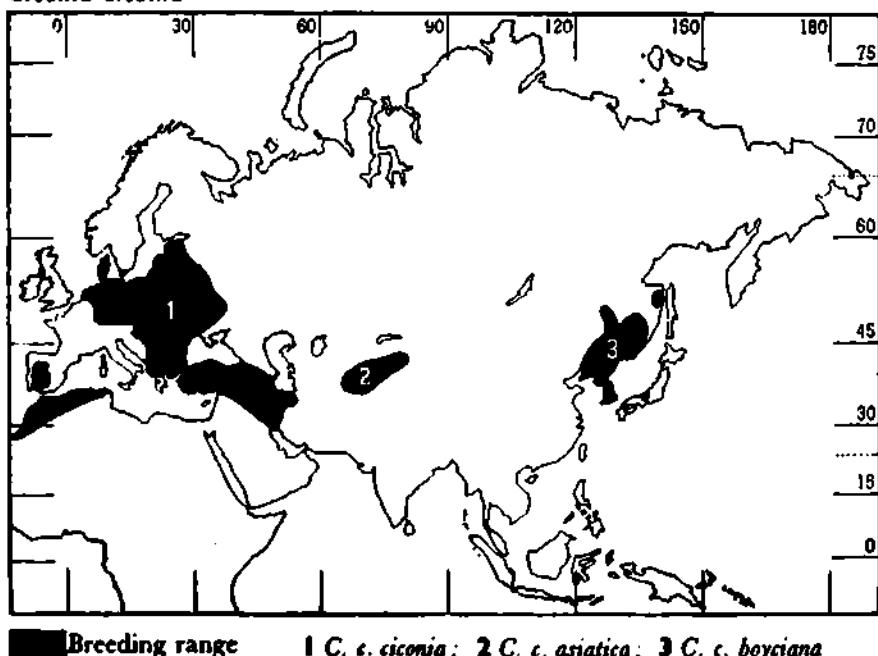
FIELD CHARACTERS. A long-legged, long-necked, egret-like bird, all white except for the longer scapulars and wing quills which are black. Legs and heavy pointed bill red. Feathers of head, neck, and breast long and lanceolate. Sexes alike.

Young (immature). Like adult, but the black parts are brown or tinged brown, and some of the shorter scapulars have brown centres.

Nestling (in down), snow white, with blackish bill and grey legs and feet.

STATUS, DISTRIBUTION and HABITAT. Winter visitor, arriving September/October, all gone by March/April. Fairly common in West Pakistan, northwestern India, Nepal terai. In smaller numbers east and south in the Gangetic Plain (Uttar Pradesh, Bihar, Orissa, W. Bengal), Assam, East Pakistan, Madhya Pradesh, Gujarat, Rajasthan, Maharashtra. Decreasingly south through the Deccan (Andhra, Madras, Mysore). The records from the eastern side of the subcontinent — Bengal, E. Pakistan, Assam, etc. — probably relate to the next subspecies (*boyçiana*).

Ciconia ciconia



■ Breeding range 1 *C. c. ciconia*; 2 *C. c. asiatica*; 3 *C. c. boyçiana*

There is a single sight record from Ceylon where it is evidently a rare straggler. Also a very doubtful and incredible one of a pair nesting in the NW. Province of the island in 1880 (Wait 1931 : 419).

Parties or small flocks by jheels and in marshy fields, etc.

Extralimital. Breeds in Europe north to 60° N. lat., N. Africa, Western Asia (Asia Minor, Iraq, Iran, Turkestan).

GENERAL HABITS. Stalks along sedately in search of food on marshy grassland, freshly drained fallows or moist fields ploughed for winter crops. Though almost domesticated and enjoying protection by popular sentiment as a harbinger of good luck in most countries where it nests, the bird is

usually wary and difficult to approach in its Indian winter quarters. Flight — a few flaps followed by a glide — appears leisurely, but is fast and strong. Royal Air Force pilots in Mesopotamia during World War I clocked the speed of migrating storks at about 48 miles (77 km.) per hour. Has the common habit of soaring on thermals and gliding in circles high up in the heavens for many hours at a stretch in company with its allies — other stork species, pelicans, etc. Often roosts at night in bare tree-tops.

FOOD. Frogs, reptiles, crustaceans, young rodents, occasionally fish, but very largely orthopterous insects, of which seasonally locusts in all stages — from egg to adult — form a considerable proportion. For this reason it enjoys additional protection in many countries both in its breeding and wintering areas.

VOICE. Poorly developed. Adults practically silent but for the characteristic bill-clattering of the family — a form of 'percussion music'. In this the head is thrown backward till the crown and culmen nearly touch the back. The mandibles are clattered rapidly, producing a castanet-like rattling, variable in volume and tempo. The puffed-out gular pouch functions as a resonator. While thus clattering, the head is slowly returned to the normal position and continued in an arc, till the bill nearly rests on the ground. Frequently both birds of a pair (especially in courtship) indulge in a bill-clattering duet, standing breast to breast.

MIGRATION. Little precise data available for India, but southward passage (autumn) observed through NW. Pakistan, across the Great Rann of Kutch, and Rajasthan. Northward passage (spring) recorded in Kurram Valley, April to end May (Whitehead, JBNHS 20: 976). A nestling ringed in Braunschweig, Germany (*c.* 52°N., 10°E.) and recovered a few months later in Bikaner, Rajasthan (*c.* 28°N., 73°E.), was our first positive evidence that some at least of our winter visitors may derive from Europe. This is confirmed by a nestling ringed at Molkenberg, Germany (52°42'N., 12°12'E.) 3.vii.1971, recovered at Tirunelveni, Tamil Nadu (*c.* 8°44'N., 77°41'E.) January 1973 — *c.* 7600 km. ESE.

BREEDING. Extralimital. Season, March to May. Nest, a large stick platform placed on buildings, chimney stacks, cliffs or tall trees near human habitations. In the Middle East old mosques are commonly resorted to, whence the bird's claim to veneration by the Muslim populace. Known in Iran as *Hāji Lāglāg* from its habit of settling on mosques and the popular belief that it migrates annually for pilgrimage to Mecca! Eggs, 3 to 5, pure white. Average size of 120 eggs 73·2 × 58·8 mm. (Baker). Incubation period about 30 days.

MUSEUM DIAGNOSIS

| MEASUREMENTS | Wing | Bill (from feathers) | Tarsus | Tail |
|--------------|---------|-------------------------|-------------------|-------------|
| ♂ ♂ | 530—635 | <i>c.</i> 150–220 } | <i>c.</i> 180–230 | 215–240 mm. |
| ♀ ♀ | 530—590 | <i>c.</i> 140–175 } | | |

COLOURS OF BARE PARTS. Iris brown or greyish brown. Bill bright red. Bare loral and orbital skin, and chin, black. Legs and feet bright red.

The Turkestan race *asiatica*, supposedly larger and with a larger bill, is not sufficiently differentiated and of dubious validity.

64. Eastern White Stork. *Ciconia ciconia boyciana* Swinhoe

Ciconia boyciana Swinhoe, 1873, Proc. Zool. Soc. London : 513 (Yokohama)

Ciconia alba asiatica Severtzov, 1873, Bull. Imp. Soc. Friends Nat. Sci. Anthr. and Ethnogr. Moscow 8(2) : 145 (Turkestan)

Baker, FBI No. 2208. Vol. 6: 322

LOCAL NAMES. As for 63.

SIZE. Slightly larger than the preceding, but difference hardly perceptible in the field.

FIELD CHARACTERS. Differs from No. 63 chiefly in having a larger and black (*contra red*) bill.

STATUS, DISTRIBUTION and HABITAT. Uncommon winter visitor to Assam, Manipur, and E. Pakistan, where Stuart Baker saw a pair ('with conspicuous black bills') in Khulna.

Extralimital. Breeds from Lower Ussuri and Amur rivers to Korea and Japan.

GENERAL HABITS. Same as in the nominate race. Nothing specifically recorded in its Indian winter quarters.

MUSEUM DIAGNOSIS. Black bill and larger measurements: ♂ ♀

Wing 620-70; bill (from feathers) 195-222 (Baker), (from skull) 200-60 mm. (Hartert).

COLOURS OF BARE PARTS. 'Iris rosy pink with an outer ring of black' (David & Oustalet). Bill black in breeding season, tinged purplish at base. Other parts as in nominate race (Baker). 'Naked skin round eye red; skin of [throat] pouch red; bill blackish; legs and feet red' (La Touche).

65. Black Stork. *Ciconia nigra* (Linnaeus)

Ardea nigra Linnaeus, 1758, Syst. Nat., ed. 10, 1: 142 (Sweden)

Baker, FBI No. 2209, Vol. 6: 323

Plate 6, fig. 3, facing p. 112

LOCAL NAME. *Surnal* (Hindi).

SIZE. White Stork ±; standing c. 106 cm. (3½ ft.) to top of head.

FIELD CHARACTERS. A black stork with white underparts.

Adult. *Above*, including head and neck, black highly glossed with green, bronze and purple. *Below*, lower breast, belly, flanks and under tail-coverts white. Sexes alike.

Young (immature). Head, neck and upper breast dark brown, each feather tipped paler. Mantle dull brownish black. Underparts white.

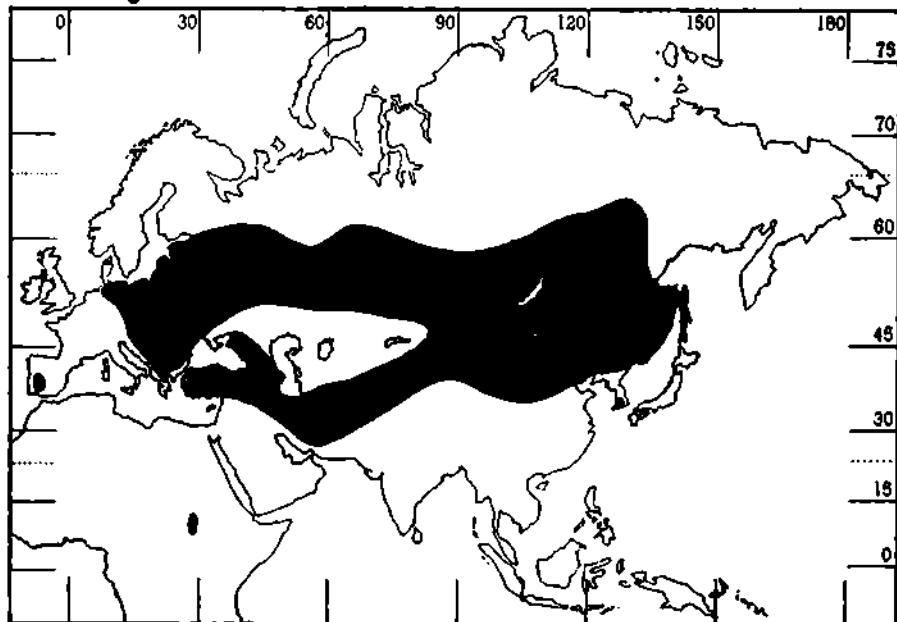
Nestling (in down). Snow-white with lemon-yellow bill and bright rosy legs which later turn almost white.

STATUS, DISTRIBUTION and HABITAT. Winter visitor to West Pakistan and northern India, from Baluchistan, Sind, NWF. Province, and the Punjab through the Nepal lowlands (to c. 900 m. alt.) and the Gangetic Plain to eastern Assam; south through Rajasthan normally to about Kutch and northern Gujarat. Rare in the Deccan, south to c. 18°N. lat. (Sholapur dist.). Has not been recorded in South India, and only once in Ceylon (Phillips, *Ibis* 1940: 333-4). Occurs on spring passage in Kashmir (Ward, JBNHS 17: 947), and in both spring and autumn in Gilgit (Scully, SF 10: 143).

Extralimital. Breeds in Denmark, Sweden, and Germany, east through Russia and Asia to N. China. Winters also in Africa.

GENERAL HABITS. Not appreciably different from those of the White Stork except that perhaps it usually keeps more to marshy ground and the neighbourhood of rivers and inland waters, and is even more shy and wary. Seen in pairs, small parties of 10 or 12, or large herds — an exceptional one of 'not less than 500' recorded by Hume near the Chenab river, Punjab (SF 1: 106). Its association with the Whitenecked Stork has been repeatedly remarked.

Ciconia nigra



■ Breeding range

FOOD. Animal matter — frogs, fish, crustacea, insects, and occasionally young or disabled rodents, birds, etc.

VOICE. Seldom heard in India, but in breeding season said to be more vocal than White Stork, adults producing a variety of guttural notes (reported by several observers as 'melodious'), and nestlings a heron-like chatter. Bill-clattering is rare.

BREEDING. *Season*, in central Europe April/May. *Nest*, a large stick platform built in a lofty pine, oak, or other tree, 10 to 25 metres from the ground; never on buildings. *Eggs*, 3 to 5, blunt oval, white. Average size of 100 eggs 65.3 × 48.7 mm. (Baker).

(For a full account of breeding, courtship, etc. see Witherby *et al.* 1939, 3: 116-18, mostly culled from the excellent observations of Horst Siewert in Germany, recorded in his book *Storche*, 1932.)

MUSEUM DIAGNOSIS. For full description of plumages etc. see Witherby 1939, 3: 117-18.

| MEASUREMENTS | Wing | Bill | Tarsus | Tail |
|--------------|---------|----------------------------|------------|------------------------|
| ♂ ♀ | 520-605 | 160-190 (from feathers) | c. 180-200 | 190-240 mm. (Baker) |

Weight of an adult male recorded by Scully, 7 lb. (= c. 3·17 kg.).

COLOURS OF BARE PARTS. Iris brown or black. Bill red, pale at tip. Bare facial skin deep red. Legs and feet coral or scarlet-red.

MISCELLANEOUS. Longevity: 14 years (*Ring*, 1962, 33: 148).

Genus EPHIPPIORHYNCHUS Bonaparte

Ephippiorhynchus Bonaparte, 1885, *Consp. Av.* 2: 106. Type, by monotypy, *Mycteria senegalensis* Shaw

Bill very long, and curved slightly upwards at the tip. Tarsus very long. Head and neck completely feathered.

66. Blacknecked Stork. *Ephippiorhynchus asiaticus asiaticus* (Latham)

Mycteria asiatica Latham, 1790, *Index Orn.*, 2: 670 (India)

Baker, FBI No. 2211, Vol. 6: 326

Plate 2, fig. 10, facing p. 32

LOCAL NAMES. *Banaras, Lohärjäng, Loha sarang* (Hindi); *Lohär jäng or Lohä jängha* (Bengal); *Telia hârêng* (Assam); *Periya nârdi* (Tamil); *Peddd nällâ konga* (Telugu); *Ali kokka* (Sinhala).

SIZE. Painted Stork +; standing c. 135 cm. (4½ ft.) to top of head.

FIELD CHARACTERS. A handsome black-and-white stork with massive black bill and long coral-red legs. In overhead flight large size, black neck and bill, pure white underparts (including all wing quills) with a broad black diagonal band across each wing diagnostic.

Adult. *Above*, head, neck, scapulars, and tail black, brilliantly glossed with green-blue, purple, and bronze. Back (interscapulars to upper tail-coverts) pure white. *Below*, from upper breast to under tail-coverts, pure white. Sexes alike except for colour of eyes; brown in male, conspicuous bright lemon-yellow in female.

Young (immature). Rather like a large washed-out example of Black Stork: the glossy black parts replaced by dull brown; white parts less pure and duskier.

Nestling (in down). Completely snow-white at first, head and neck changing to greyish black later.

STATUS, DISTRIBUTION and HABITAT. Resident. Widespread but sporadic and nowhere abundant. All India (rare in the south), both Pakistans, Nepal terai, Ceylon (low country dry zone). Affects lowland marshes, jheels, and large rivers. Occasionally tidal mangrove swamps.

Extralimital. Burma, Malaysia, Thailand, Indochinese countries. The race *australis* extends the species to Australia.

GENERAL HABITS. Keeps solitarily or in widely separated pairs apparently with recognized feeding territories; after the breeding season in small parties consisting of adults and young. Usually seen wading in shallow water or stalking sedately on a squelchy marsh in search of food, or squatted on its tarsi on dry ground at the edge. Has the characteristic stork habit of soaring and circling aloft in the heat of the day. Normally shy and suspicious.

FOOD. Chiefly fish, but also frogs, reptiles, crabs, and any other small animals that can be come by. Observed capturing live coots, once in skimming flight, and swallowing them entire (Panday, J. D., 1974, *JBNHS* 71(1): 141).

VOICE. Of adults unrecorded. When disturbed on nest, or otherwise agitated, e.g. a wounded bird about to be captured, the bill is clattered aggressively. Downy nestlings being hand-reared produced 'a sort of chack followed by wee-wee-wee repeated two or three times'. They also stretched up their necks and clattered their bills when suddenly disturbed, and then produced the above sounds (McCann, JBNHS 34: 581).

DISPLAY. Since Hume's vivid but fragmentary account in *Nests and Eggs of Indian Birds* (1890, 3: 266) nothing new has been added to warrant a reinterpretation of the antics described. Hume wrote: 'A pair will gravely stalk up to each other, and when about a yard or two feet apart will stand face to face, extend their long black and white wings, and while they flutter these very rapidly, so that the points of the wings of the one flap against the points of the other's wings, advance their heads till they nearly meet, and both simultaneously clatter their bills like a couple of watchmen's rattles.' See also Kahl, M. P., 1970, JBNHS 67(3): 457-8.

BREEDING. Season, overall September to December varying locally with the early or late cessation of the rains. Nest, an enormous platform of sticks, often thorny, 1 to 2 metres in diameter, with the central portion lined with straw, leaves, bits of rag, etc. Placed singly 20 to 25 metres up near the top of a large peepul (*Ficus religiosa*) or similar tree standing solitary in the midst of cultivation, not necessarily close to water. Eggs, 3 or 4, rarely 5, typical broad blunt smooth-textured ovals, white in colour with the inner membrane dull green. Average size of 75 eggs 72.1 x 53.4 mm. (Baker).

Both sexes build the nest and feed the young by regurgitation on to the nest floor. Share of the sexes in incubation, and incubation period, unrecorded.

MUSEUM DIAGNOSIS

MEASUREMENTS

| | Wing | Bill (from feathers) | Tarsus | Tail |
|-----|---------|-------------------------|------------|------------------------|
| ♂ ♀ | 565-645 | 298-324 | c. 300-333 | 257-281 mm. (Baker) |

COLOURS OF BARE PARTS. Iris ♂ dark brown; ♀ lemon-yellow. Bill black. Naked skin of gular pouch and eyelids dull purple. Legs and feet coral-red.

Genus LEPTOPTilos Lesson

Leptoptilos Lesson, 1831, *Traité d'Orn.*, livr. 8: 583. Type, by subsequent designation, *Ardea dubia* Gmelin

Cf. Kahl, P., 1972, *Ardea* 60: 97-111.

Bill very large, high at base, tapering gradually to tip. Culmen and commissure almost straight, the former about as long as, or a little longer than, tarsus. Nostrils small, narrow, placed near culmen. Head and neck naked except for sparse scattered hair-like feathers. Crown bald.

67. Adjutant Stork. *Leptoptilos dubius* (Gmelin)

Ardea dubia Gmelin, 1789, *Syst. Nat.*, 1(2): 624 (India)

Baker, FBI No. 2212, Vol. 6: 327

Plate 2, fig. 9, facing p. 32

LOCAL NAMES. *Härgila*, *Gärür*, *Peda dhauk* (Hindi); *Dhēnk* (Mirshikars, Bihar); *Dusta* (Hindi in Deccan); *Härgila* (Bengal); *Peenigālā konga* (Telugu).

SIZE. Vulture +, standing 120–150 cm. (4 to 5 ft.) to top of head.

FIELD CHARACTERS. The largest and ugliest of our storks; black, grey and dirty white with naked reddish and yellow head and neck and a huge four-sided wedge-shaped bill. A naked pinkish gular pouch 25–35 cm. long, hanging from base of neck, distinguishes it from the Smaller Adjutant (next species).

In overhead flight the broad black wings with a whitish band along the middle are distinctive.

Adult (breeding). *Above*, including wings and tail, blackish slaty grey slightly glossed with green. Innermost secondaries and greater wing-coverts silvery grey forming a broad band on wing. A ruff of fluffy white feathers round base of neck. *Below*, white, including soft flimsy under tail-coverts.

Adult (non-breeding) lacks the silvery grey wing-band. Sexes alike.

Young (immature). Scantly feathered on the naked parts. Inner secondaries and coverts dark brown. **Nestling (in down).** Pure white.

STATUS, DISTRIBUTION and HABITAT. Uncertain. Largely nomadic and local migrant. Breeding principally, and abundantly, in Burma, but only sporadically in Assam, Orissa, and the Sunderbans. Not uncommon in northern India — chiefly during the rains — from Sind through Kutch, N. Gujarat, Rajasthan, Nepal terai, and the Gangetic Plain to Assam and E. Pakistan. Rare in the Deccan. Not recorded in the southern Peninsula, Andamans, or Ceylon. At jheels and marshes, and on outskirts of habitations.

Extralimital. Burma, Thailand, Malaysia, Indochinese countries, Sumatra, Java, Borneo.

GENERAL HABITS. Keeps singly or in small parties, stalking about with a martial gait (whence its English name) on marshland and jheels, particularly where the water is drying and concentrating the fish life in shallow puddles. When not actively feeding it spends the time standing hunched up, or squatting on its shanks head ludicrously drawn in between the shoulders, and often with the mandibles agape. The birds consort freely with kites and vultures to feast on animal carcasses dumped on the countryside or on village outskirts. In the last century, when municipal sanitation was more primitive than now, large numbers of Adjutants haunted the city of Calcutta, perching boldly on rooftops etc. for the offal and refuse, and rendered valuable service as scavengers. The flight, attained by running a few steps for the take-off with noisy flapping of the huge wings, is the acme of grace and buoyancy once the bird is fairly launched, and its effortless sailing in circles high up in the heavens in company with vultures and other storks is a sight that never fails to impress. The precise significance and function of the pendent sac at the base of the neck is obscure. It communicates with the nasal cavity and is unconnected with the gullet. Therefore it cannot receive or store food as is popularly believed. In greeting display bill pointed vertically upward and clattered loudly (*contra* downward in African Marabou — Kahl).

FOOD. Fishes, frogs, reptiles (*Vipera russelli*, *Uromastix hardwickii* taken from stomachs), crustaceans, and almost any manageable living thing it can come by. Also largely carrion. Observed walking down, capturing and swallowing maimed wild ducks (Panday, J. D., 1974, JBNHS 71(1): 141).

VOICE. Besides the characteristic bill-clattering of the family it is described as emitting a sound like 'the lowing of a cow when separated

from her calf' (Oates), and 'a loud grunting croak not unlike the low of a buffalo'. How these sounds are produced is not known since the bird is devoid of true voice muscles.

DISPLAY. Only incompletely recorded. Courtship dance described as similar to that of the Blacknecked Stork (q.v.), but copulation only observed in a tree and not following the dance on the ground (Baker).

BREEDING. Season, overall October to January, varying locally with early or late cessation of the rains. The only specific record for India is an old one (January 1883) of Baker's in the Khulna Sunderbans where about 40 or 50 pairs nested for many years on lofty trees in dense forest on the edge of a vast area of swamp and lake. The breeding grounds *par excellence*, however, seem to lie in S. Burma where incredible numbers congregate to breed on the pinnacles of the limestone rocks and in lofty trees along the Ataran river in Pegu district. It has been suggested that Indian Adjutants probably all migrate to this area to nest. (For a full account of the remarkable colony see Hume & Oates 1890, 2: 260-4.) According to Smythies 1953: 523, no recent information is available about this colony.

Nest, an enormous platform of coarse sticks 1 to 2 metres in diameter and up to a metre deep, placed far out on a near-horizontal branch of a lofty tree such as *Salmalia*. **Eggs**, 3 or 4 — sometimes 2, but never 5 — white, usually badly soiled. Broad ovals, more or less equal at both ends; fine-textured and smooth-surfaced with the inner membrane very dark green. Average size of 50 eggs 77.3 × 57.5 mm. (Baker). Both sexes share in nest building and incubation; presumably also in feeding the young (not recorded). Incubation period unknown.

MUSEUM DIAGNOSIS

MEASUREMENTS

| | Wing | Bill (from feathers) | Tarsus | Tail |
|-----|---------|-------------------------|---------|------------------------|
| ♂ ♀ | 800-820 | 320-345 | 320-330 | 310-335 mm. (Baker) |

COLOURS OF BARE PARTS. Iris white or yellowish white (adult); blue-brown (young). Bill pale yellowish or greenish fleshy, more red near base in breeding season. Bare skin of head dull reddish brown, turning to brick-red on hindneck and blackish on forecrown. Pouch and neck yellow; more pink on pouch and fleshy pink on the end, where it is moreover spotted with black. Legs and feet pale greyish white to pale horny brown.

'The pouch can be extended to a great size, looking like a child's pink balloon with smearable black spots' (Baker).

MISCELLANEOUS. The popular folk belief, recorded by the Mogul Emperor Baber in his Memoirs, still persists that if you split the head of an Adjutant before death you may extract from it the fabulous *Zahar-mohra* or 'snake-stone', allegedly a potent antidote against snake- and all other kinds of poison.

68. Lesser or Haircrested Adjutant. *Leptoptilos javanicus* (Horsfield)

Ciconia Javanica Horsfield, 1821, Trans. Linn. Soc. London, 13(1): 188 (Java)
Baker, FBI No. 2213, Vol. 6: 329

LOCAL NAMES. *Chinjārā*, *Chandana*, *Chandiari*, *Bang gor*, *Chhota gārūr* (Hindi); *Mddāñchūr*, *Madantāk* (Bengal); *Tokla moora* (= 'bald head', Assam); *Bor*

tokola (Nowgong, Assam); *Dodal konga, Dodal gatti gadu* (Telugu); *Meva kokku* (Tamil, Ceylon); *Mâna* (Sinhala); *Vayalnaicken* (Malayalam).

SIZE. Vulture +; standing 110–120 cm. (3½ to 4 ft.) to top of head.

FIELD CHARACTERS. A large stork with massive dirty yellowish wedge-shaped bill. Chiefly glossy metallic black above, white below, with sparse hair-like feathers on almost naked reddish yellow head and neck. Very similar to the Adjutant, but somewhat smaller size, less erect carriage, black instead of slaty upperparts, and absence of neck-pouch diagnostic. Sexes alike.

In non-breeding plumage lacks the copper spots near the tips of the larger secondary coverts.

Young (immature). Upper plumage less glossy; head and neck more feathered.

STATUS, DISTRIBUTION and HABITAT. Resident, nomadic (especially in the rains), and locally migratory. Assam, Bengal, East Pakistan, Bihar, Orissa, Kerala, Ceylon. Recorded also from Andhra, Uttar Pradesh (Lucknow Division), Delhi, Nepal terai, Kutch and Rajasthan, but uncommon in continental India. Affects well watered tracts — swamps and pools in forest, jheels, flooded land, etc.

Extralimital. Burma, Malaysia, Borneo, Java, Sumatra, S. China.

GENERAL HABITS. Usually solitary; not different from the Adjutant's except that it is less of a scavenger, does not haunt the neighbourhood of human habitations, and is much more shy and retiring. At close quarters the noise made by its wings in flight has been likened to the humming of telegraph wires in a wind. See also Kahl, M. P., 1970, JBNHS 67(3): 459–60.

FOOD. Fish, frogs, reptiles, crustaceans, and locusts recorded.

VOICE. 'Heard making same guttural noise as *Ciconia episcopus*' (Inglis, JBNHS 15: 75). No other data.

DISPLAY. Beyond that 'the nuptial dance consists of the same fantastic steps and gestures as those assumed by the Large Adjutant', and that both sexes take an equal part in the display, nothing recorded.

BREEDING. Baker, 1935, (4 : 448–9): 'Nesting in Ceylon, Travancore, parts of the Malabar coast, Madras Presidency, E. Bengal, and Assam.' For some of these areas, e.g. Kerala, only circumstantial evidence is so far available. Within our limits Assam is probably where the largest number of nests is to be found. Season, November to January. Nest, a huge stick platform c. 120 to 150 cm. in diameter and 30 to 120 cm. deep depending upon for how long annually renovated. Placed in lofty trees such as *Salmalia* standing in forest, 12 to 30 metres from the ground. Eggs, indistinguishable from those of the larger Adjutant even in size. Average of 50 eggs 76·4 × 55·3 mm. (Baker). A curious habit, apparently fairly general, is reported by Baker of the birds jabbing their eggs with their bills when agitated, as by a collector climbing up to the nest. Share of the sexes in the domestic chores, as well as incubation period, unrecorded.

MUSEUM DIAGNOSIS

MEASUREMENTS

| | Wing | Bill (from feathers) | Tarsus | Tail |
|-----|---------|-------------------------|---------|-------------|
| ♂ ♀ | 580–600 | 260–305 | 228–268 | 230–253 mm. |

COLOURS OF BARE PARTS. Iris white. Bill dull yellow, the tip whitish and base tinged red in the breeding season. Bare skin of crown greenish brown. Face and neck yellow, tinged with brick-red in the breeding season. Legs and feet greenish brown to almost black (Baker).

In a freshly killed non-breeding adult ♂ noted as follows: Iris slaty grey. Bald crown greyish biscuit-colour. Bill pinkish biscuit colour. Sides of head and extreme base of neck pale pink; rest of neck bright turmeric yellow. Legs, feet and claws slaty black.

Family THRESKIORNITHIDAE. Ibises, Spoonbill

Comparatively long and bare-legged gregarious waterside or marsh birds related to and resembling storks, herons, and egrets, with whom they normally associate. Plumage in Indian representatives chiefly white, or black, or chestnut with metallic gloss. Bill long, slender, grooved and decurved (ibises), or extremely flattened and spatulate at tip (spoonbill). Nostril placed at base of a long, narrow groove on each side of culmen. Face and throat, or whole head and neck, bare in some species. Neck slender, longish, outstretched in flight. Wings long; tail short. Legs and toes moderately long; tibiae partly bare; toes webbed at base. Sexes alike or nearly so.

RANGE. N. and S. America, Africa (including Madagascar), the southern Palaearctic Region, Australia. Some species migratory.

TECHNICAL DIAGNOSIS. Witherby 1939, 3: 118; Stresemann, 1927-34 Aves: 806 (under Plegadidae).

CLASSIFICATION. Ripley 1961, Synopsis: 22-23.

Key to the Indian forms

| | Page |
|--|------|
| A Bill long, curved downward, generally dark coloured, plumage white, glossy black, or chestnut..... | 1 |
| 1 Naked skin of head and neck black; plumage nearly all white, elongated inner secondaries forming slaty grey ornamental plumes (75 cm. = 30 in.)..... | 110 |
| <i>Threskiornis melanocephala</i> (adult, breeding) | 110 |
| Similar to above but plumes lacking..... | 110 |
| <i>Threskiornis melanocephala</i> (adult, non-breeding) | 110 |
| Similar to non-breeding adult but neck and most of head feathered, primaries tipped with black | 110 |
| <i>Threskiornis melanocephala</i> (juvenile) | 110 |
| Head black, naked, covered with red warts, neck feathered; plumage mostly glossy black with white patch on shoulder (68 cm. = 27 in.) | 112 |
| <i>Pseudibis papillosa</i> (adult) | 112 |
| Resembling above but lacking red warts, and plumage overall dull glossless brown..... | 112 |
| <i>Pseudibis papillosa</i> (juvenile) | 112 |
| Smaller (52 cm. = 25 in.). Plumage of head, neck, and underparts rich chestnut-brown, wings and tail glossed with metallic greenish purple..... | 114 |
| <i>Plegadis falcinellus</i> (adult, breeding) | 114 |
| Similar to above but head and neck brown, streaked with white | 114 |
| <i>Plegadis falcinellus</i> (adult, non-breeding) | 114 |
| Like non-breeding adult but overall plumage dull ashy brown instead of chestnut..... <i>Plegadis falcinellus</i> (juvenile) | 114 |

| | Page |
|--|--|
| B Bill long, straight, spatula-shaped at end, coloured black with terminal half bright yellow; plumage including bushy nuchal crest white (standing c. 60 cm. = 25 in.)..... | <i>Platalea leucorodia</i> (adult, breeding) 116 |
| Similar to above but lacking nuchal crest..... | 116 |
| | <i>Platalea leucorodia</i> (adult, non-breeding) 116 |
| Like non-breeding adult but primaries tipped with black | <i>Platalea leucorodia</i> (juvenile) 116 |

Genus THRESKIORNIS G. R. Gray

Threskiornis G. R. Gray, 1842, App. to List Gen. Eds.: 13. Type, by original designation, *Tantalus aethiopicus* Latham

Head and neck naked in adult. Bill deeply downcurved, stout, blunt. Nostril linear. Tibia feathered only on upper half; tarsus reticulated. Toes long, webbed between the bases, bordered by a membrane to the claws. Tail of twelve feathers. In breeding season inner secondaries longer than primaries, disintegrated, forming ornamental plumes.

The genus ranges from Africa through India and the SE. Asian countries and islands to Australia.

69. White Ibis. *Threskiornis aethiopica melancephala* (Latham)

Tantalus melancephalus Latham, 1790, Index Orn., 2: 709 (India)

Baker FBI No. 2203 Vol. 6: 314

Plate 2, fig. 5, facing p. 32

LOCAL NAMES. *Munda*, *Saféd bāza*, *Didhar* (Hindi); *Kachator* (Purnea, Bihar); *Mündük* (Mirshikars, Bihar); *Kastchara*, *Sada dochara* (Bengal); *Boga akoki bog* (Assam); *Tattu kokka*, *Dahākatti kokka* (Sinhala); *Thālākāththi chondan* (Tamil); *Kāshānti kokku* (Malayalam).

SIZE. Large domestic hen ±; length c. 75 cm. (30 in.).

FIELD CHARACTERS. A largish snow-white marsh bird with naked black head and neck, and long black downcurved curlew-like bill.

In flight bare blood-red patches on flanks and under wing conspicuous.

Adult (breeding), with some slaty grey in scapulars and in the elongated disintegrated inner secondaries. Long ornamental plumes overhanging base of neck. In non-breeding plumage the slaty grey scapulars, ornamental secondaries and neck plumes are replaced by ordinary feathers. Sexes alike.

Young (immature) has only face and round the eye bare; rest of head and neck feathered. In newly fledged (flying) juvenile, head and hind neck well clothed with black or slaty down. Front of neck covered with short white disintegrated feathers. Bare skin under wing black, not blood-red as in adult.

For downy chick see Museum Diagnosis.

STATUS, DISTRIBUTION and HABITAT. Resident, nomadic (and/or locally migratory), depending on water conditions. All India, both Pakistans, Nepal terai, Ceylon. Plains and plateau country.

Affects rivers, jheels, marshes, inundated ploughed land and fallows; occasionally tidal mudflats and brackish lagoons.

Extralimital. Burma, sporadically to China and Japan.

GENERAL HABITS. Gregarious. Normally parties and moderate to large flocks, often associated with storks, spoonbills, and such other marsh-frequenting birds. Saunters actively on squelchy mud or in shallow water probing with partly open mandibles into the bottom ooze, often with head almost completely submerged. Morsels of food are forceped out and swallowed with an upward jerk of the bill. Flight strong and direct attained by steady rapid wing-strokes punctuated by short glides, the head and neck outstretched, either in V-formation or in evenly-spaced single file. Roosts and nests in trees.

FOOD. Almost entirely animal — fish, frogs, molluscs, insects, worms, etc. — but some vegetable matter (algae ?) also taken. Stomachs of small downy nestlings contained pulpy olive-brown and green vegetable matter, and elytra of tiny blackish beetles, c. 5 mm. long (SA).

VOICE. Normally silent. In the breeding season 'a remarkably loud booming call' (Doig); not confirmed by other observers. In breeding colony 'a series of peculiar grunts, not loud but vibrant', likened to the murmur of many people talking together (Bates). Subdued nasal grunts by adults on the nest tree (SA).

BREEDING. Colonially, in association with storks, herons, cormorants, and other marsh birds, with a tendency to segregation into discrete *mohallas*.

Season, in N. India June/July to October, varying with early or late monsoon and filling of tanks and jheels; in S. India and Ceylon November to February/March. *Nest*, a smallish platform of sticks c. 25 to 30 cm. across, usually unlined, built in moderate-sized trees (*Acacia*, *Prosopis*, *Barringtonia*, etc.) standing in or near water, or on the tops of partially submerged shrubs (*Zizyphus*, *Capparis horrida*, etc.); sometimes on the outskirts of a village. *Eggs*, 2 to 4, smooth-surfaced long ovals, chalky white with a faint bluish tinge. Immaculate or sparingly marked with small spots and blotches of light or dark brown, more densely at the broad end. Average size of 150 eggs $63\cdot5 \times 43\cdot1$ mm. (Baker). Both sexes take part in nest-building and all the domestic chores. Incubation period estimated at 23–25 days (unconfirmed). In the heat of the day, while incubating or standing about on the nest tree, the bill is partly open, the throat pulsating incessantly. Nest-feeding by regurgitation, the nestling wrestling with the parent's bill to receive food directly from gullet. Not picked up from nest floor as in storks. Nestlings commonly predated on by Pallas's and Spotted eagles (*Haliaeetus leucoryphus* and *Aquila clanga*) and other raptors. On onslaught by eagle the parents fluff out plumage menacingly, erect rump and under tail-coverts, lower head and bill and open out wings, biting the neighbouring twigs in rage and lunging out at the marauder viciously but usually ineffectively. The eggs and hatchlings (as of other birds in heronries) suffer heavy depredation from House Crows (*Corvus splendens*), which habitually infest such places.

MUSEUM DIAGNOSIS. Chick (in down) snow-white with forehead, crown (to below ear coverts), and nape, velvety black. Chin, ventral side of neck, down centre of abdomen, and underside of wings naked or almost naked, the skin pale vinous pink. Egg tooth persists at tip of short waxy bill till third or fourth day.

MEASUREMENTS

| | Wing | Bill (from feathers) | Tarsus | Tail |
|-----|---------|-------------------------|-----------|------------------------|
| ♂ ♀ | 343-370 | 139-170 | c. 99-115 | 133-145 mm. (Baker) |

[A freshly killed ad. ♂ (Gujarat) measured Wing 381; bill (from skull) 185; tarsus 119; tail 129 mm. (SA)]

COLOURS OF BARE PARTS. Iris red-brown or red. Bill black. Naked skin of head and neck bluish black. Bare skin of flanks and under wing blood-red. Legs and feet glossy black.

Genus PSEUDIBIS Hodgson

Pseudibis Hodgson, 1844, in Gray's Zool. Misc.: 86. Type, by monotypy,
Ibis papillosa Temminck

Only the head and nape naked in adults *contra Threskiornis* which has also the neck bare. Bill slenderer, legs and feet shorter than in *Threskiornis*. Plumage principally black. Inner secondaries of normal shape in breeding season (not lengthened or disintegrated), and no long ornamental plumes at base of neck.

70. Indian Black Ibis. *Pseudibis papillosa papillosa* (Temminck)

Ibis papillosa Temminck, 1824, Pl. Col., livr. 51, pl. 304 (India)

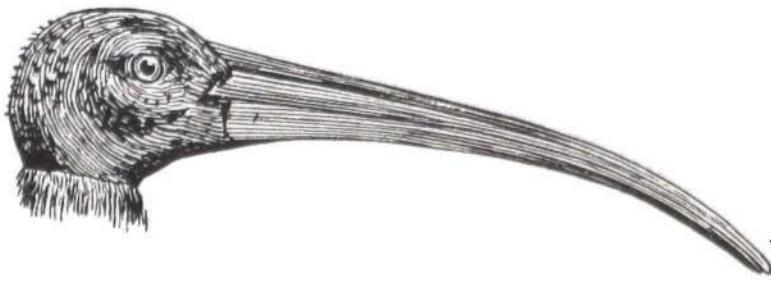
Baker, FBI No. 2204, Vol. 6: 316

Plate 5, fig. 6, facing p. 96

LOCAL NAMES. *Bāzā*, *Kālā bāzā*, *Kārān kūl* (Hindi); *Kālo dochara* (Bengal); *Kāla akohi bōg* (Assam); *Nella kānkānām* (Telugu).

SIZE. Domestic hen ±; White Ibis —. Length c. 68 cm. (27 in.).

FIELD CHARACTERS. A distinctive glossy black marsh bird with slender downcurved curlew-like bill, a small but conspicuous white patch near shoulder of wing, and brick-red legs. A triangular patch of brilliant red warts covering top of naked black head. Sexes alike.



× c. $\frac{1}{2}$

Young (immature). Overall dull glossless brown including feathered crown, head, and throat.

STATUS, DISTRIBUTION and HABITAT. Resident. West Pakistan (Sind), Gujarat, Rajasthan, and throughout the Gangetic Plain and peninsular India south to Mysore. Sparingly in Nepal (terai and dun), Bengal, and



PLATE 6

1 *Pelecanus onocrotalus*, Rosy Pelican (20). 2 *Ciconia c. ciconia*, White Stork (63). 3 *Ciconia nigra*, Black Stork (65). 4 *Phoenicopterus roseus*, Flamingo (73). 5 *Phoeniconaias minor*, Lesser Flamingo (74). 6 *Gypaetus b. aureus*, Bearded Vulture (188). 7 *Gyps himalayensis*, Himalayan Griffon (181). 8 *Neophron p. ginginianus*, Scavenger Vulture (187). 9 *Pavo cristatus*, Common Peafowl (311).

Assam. Not recorded from the West Coast, Kerala, Ceylon, or the Andamans. Affects dry plains and cultivated country.

Extralimital. Recorded as having occurred in Arakan, though the race normally found in Burma, Thailand, and the Indochinese countries is *davisoni* in which the red warty patch on head is obsolete.

GENERAL HABITS. Keeps in small parties of 3 or 4 or flocks of 8 to 10 individuals; sometimes up to 50 or more. Less dependent on water than White Ibis, preferring to forage on the drier margins of jheels, river banks, and in stubble fields; only occasionally wading into puddles. Flight and behaviour similar to that of White Ibis.

FOOD. Among the stomach contents of specimens, Mason & Lefroy (1912) identified frogs, small fish, earthworms, beetles and other insects (including *Brachytrypes achatinus* adults, and larvae of *Cybister confusus*, *Agrotis* sp., and *Hydrophilus* sp.). In addition, lizards, small snakes, scorpions, crustaceans, and a quantity of grain have also been recorded.

VOICE. On the whole silent. A loud nasal screaming cry of two or three notes reminiscent of the Brahminy Duck (*Tadorna ferruginea*), uttered chiefly on the wing (SA).

BREEDING. Not in mixed heronries. Usually individual nests by themselves; rarely small colonies of 3 to 5 pairs in same tree. *Season*, variable: between March and October in N. India; later in Gujarat, Deccan, and the south. *Nest*, a large stick platform c. 35 to 60 cm. in diameter, 10 to 15 cm. deep, loosely and untidily lined with straw. Built in a large tree such as banyan or peepul, or among the bases of leaf stalks in a palmyra (*Borassus*) palm, 6 to 12 metres up. Old nests of kites and vultures frequently utilized. Fresh material added to the nests even when incubation well advanced. *Eggs*, 2 to 4, pale bluish green, some spotless but the majority sparsely flecked and blotched with pale reddish; broad to moderately long ovals with a smooth surface. Average size of 59 eggs 63·0 × 43·8 mm. (Baker). Both sexes incubate. Period of incubation, and other details, unrecorded.

MUSEUM DIAGNOSIS

MEASUREMENTS

| | Wing | Bill (from feathers) | Tarsus | Tail |
|-----|---------|-------------------------|----------|------------------------|
| ♂ ♀ | 365–400 | 138–158 | c. 75–85 | 165–194 mm. (Baker) |

COLOURS OF BARE PARTS. Iris brownish yellow to bright orange-red. Bill plumbeous green to dull blackish green. Naked skin of head black; crown and nape bright coral-red or brick-red. Legs and feet brick-red.

Genus PLEGADIS Kaup

Plegadis Kaup, 1829, Skizz. Entw.-Gesch.: 82. Type, by monotypy, *Tantalus falcinellus* Linnaeus

Head feathered except on lores and a small area in front of eyes. Tarsi long, scutellated in front, reticulated behind. Toes long and slender; claw of middle toe pectinated. Bill long, curved, more slender even than in *Pseudibis*.

71. **Glossy Ibis.** *Plegadis falcinellus* (Linnaeus)*Tantalus Falcinellus* Linnaeus, 1766, Syst. Nat., ed. 12,: 241 (Austria and Italy)

Baker, FBI No. 2206, Vol. 6: 318

Plate 5, fig. 7, facing p. 96

LOCAL NAMES. *Kawari, Kowar, Chhōta büza* (Hindi); *Kachia tora* (Bengal); *Thāt kānkānām* (Telugu); *Kārāppu kottan* (Tamil, Ceylon); *Ratu dae tuduwa* (Sinhala).

SIZE. Domestic hen ±; Black Ibis —. Length c. 52 cm. (25 in.).

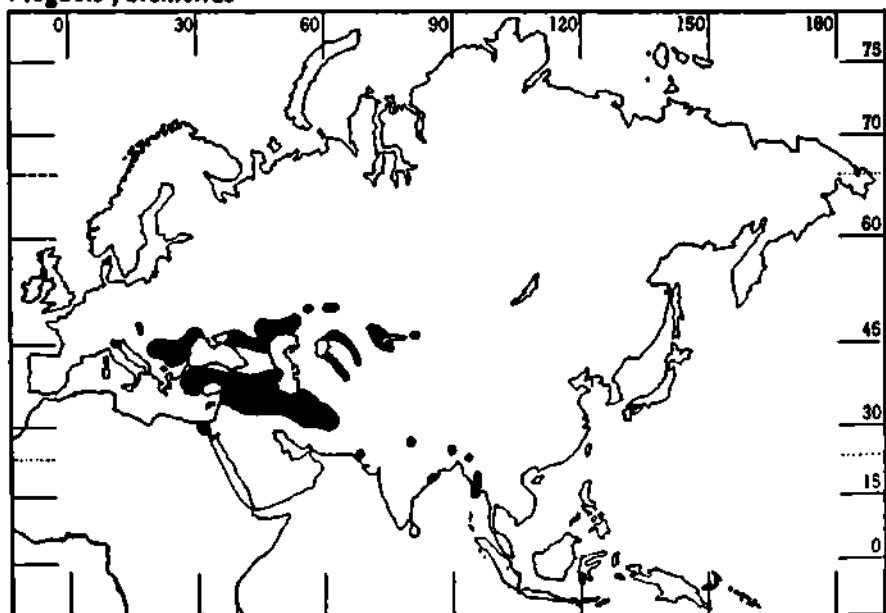
FIELD CHARACTERS. A small blackish ibis with feathered head and characteristic slender downcurved bill.

Adult (breeding). *Above*, rich dark chestnut or maroon-brown, heavily glossed with green and purple on head, neck, chin, throat, lower back, and rump. Tail black glossed with green and purple. *Below*, chestnut. Under tail-coverts and axillaries deep purple. Sexes alike.

Adult (non-breeding). Head and neck brown, streaked with white. Scapulars and innermost wing-coverts glossy green-blue.

Young (immature). Like adult in winter, but dull (unglossed) ashy brown instead of chestnut.

Plegadis falcinellus



■ Breeding range

Nestling, clothed in black down. Bill rose-coloured, with a black band at middle and tip which disappear with fledging of chick (Heinroth).

STATUS, DISTRIBUTION and HABITAT. Partly resident and nomadic, partly winter visitor. West Pakistan (Sind), Uttar Pradesh, Nepal (plains and terai), Gangetic Plain, Madhya Pradesh, Deccan, Rajasthan, Kutch, Gujarat, Orissa, W. Bengal, E. Pakistan (Sylhet, Faridpur), Assam, Manipur. Very rare in Ceylon and Maldives Is., recorded only six times, August to January, between 1960 and 1973 (CBCN).

Extralimital. S. Europe, the Mediterranean and Middle East countries, Baluchistan, Afghanistan, Turkestan, Burma. Also Africa, Madagascar, and parts of southern North America. The race *peregrinus* inhabits the Philippines and Indonesia to Australia.

MIGRATION. A juvenile ringed in the Volga Delta, USSR, c. 45°55' N., 47°45'E. (9.vii.1931) was recovered at Deolali, Nasik dist., c. 20°N., 74°E. (14.iii.1934). Another juvenile ringed in the same locality, 12.vii.1941, recovered in Malda district, West Bengal, c. 25°N., 88° 30'E. (c. 15.iv.1942). These constitute our first positive proof that the resident population is augmented in winter by northern migrants.

GENERAL HABITS. Gregarious; usually tame and confiding. Small parties or flocks of up to 40 or 50. Feeds like White Ibis on marshland or in shallow water, sometimes wading in up to the belly and submerging head completely. Flight — a series of rapid wing-beats followed by a glide — and other habits similar to White and Black Ibises (qq.v.). Flocks fly in V-formation or in diagonal wavy ribbons. Perches and roosts on trees.

FOOD. Molluscs, crustaceans, worms and insects. Possibly also tadpoles and small frogs as recorded elsewhere.

VOICE. Normally silent. In breeding season adults utter a peculiar bleating reminiscent of a sheep (Heinroth). Another call described as 'a decidedly corvine prolonged guttural croak' (Lilford).

BREEDING. Colonial; in mixed heronries. Sporadic. Recorded in Sind, Oudh, Orissa, Assam, Manipur. Season, mainly May to July. Nest smallish, of sticks, c. 30 cm. across and c. 12 cm. deep, on moderate-sized trees such as kändi (*Prosopis spicigera*) standing in clumps in or near water. Eggs, 2 or 3 (in Europe up to 5), deep unspotted blue-green, smooth-textured long ovals, more or less pointed at both ends, somewhat more at the small end. Average size of 100 eggs 52·18 × 36·9 mm. (Baker). Both sexes share incubation. Period 21 days (Heinroth). No details recorded in India; for Europe see Witherby 1939, 3: 123.

MUSEUM DIAGNOSIS

MEASUREMENTS

| | Wing | Bill (from feathers) | Tarsus | Tail |
|-----|---------|-------------------------|-----------|--------------------|
| ♂ ♀ | 248-298 | 99-144 | c. 85-100 | 94-106 mm. (Baker) |

Female smaller than male: for European birds Wing ♂ ♂ 290-306; ♀ ♀ 264-277 mm. Weight c. 750 gm. (Heinroth).

COLOURS OF BARE PARTS. Iris grey, brown, or mottled grey and brown. Bill dark livid, olive-grey or plumbeous brown; ('bare skin at base lead-blue' — Ticehurst). Naked skin of face and round eye livid. Legs and feet bronze-brown, bluish ('greenish' — Ticehurst) above 'knee'.

MISCELLANEOUS. Longevity (from ringing data) c. 20 years (Ring, 1962, 33: 148).

Genus PLATALEA Linnaeus

Platalea Linnaeus, 1758, Syst. Nat., ed. 10, 1: 139. Type, by subsequent designation, *Platalea leucorodia* Linnaeus

Both mandibles greatly flattened, becoming broader and spoon-shaped at the tip, where they are slightly decurved. Face and throat naked. Legs long; tibia feathered; tarsus reticulated in front and behind. Toes long, bordered by a membrane, webbed at base.

72. **Spoonbill.** *Platalea leucorodia major* Temminck & Schlegel

Platalea major Temminck & Schlegel, 1849, in Siebold, Fauna Jap., Aves: 119,
pl. 73 (Japan)

Baker FBI No. 2202, Vol. 6: 311

Plate 5, fig. 8, facing p. 96

LOCAL NAMES. *Chāmāch bāzā*, *Chāmchā* (Hindi); *Chinta*, *Khunte bāk* (Bengal); *Khantiya bōg* (Assam); *Gentā mūkū konga* (Telugu); *Kārāndi mūkh nārē* (Tamil, T.N.); *Chāppāi chondan* (Tamil, Ceylon); *Handi alawā* (Sinhala).

SIZE. Domestic duck +; standing c. 60 cm. (24 in.) to top of head.

FIELD CHARACTERS. A long-legged, long-necked, snow-white marsh bird with a distinctive long, flat, black-and-yellow spatula-shaped bill. A cinnamon-yellow patch at base of foreneck, naked yellow throat, and long, bare, black legs. Sexes alike. In breeding season with a long white bushy nuchal crest, erected in display or to express anger or other emotions.



× c. $\frac{1}{2}$

Young (immature), has the primary wing-coverts tipped with black. All primaries black-shafted, the first three largely blotched and mottled with black, 4th and 5th with black tips.

Nestling, covered with white down. Bill at hatching of normal shape, short, pink, and fleshy, gradually thickening and becoming bulbous at tip with slight decurvation. Assumes characteristic 'spoon' shape when chick full-fledged.

STATUS, DISTRIBUTION and HABITAT. Partly resident and nomadic, partly winter visitor. West Pakistan (Baluchistan, Sind), East Pakistan, practically all India, Nepal (terai), and Ceylon. Plains and plateau country. Affects marshes, jheels, rivers; occasionally tidal creeks and mangrove swamps.

Extralimital. 'Central Asia from China, southern Transbaikalia, Ussuri-land and Japan south to Syria, Egypt, India, and Formosa. Migratory in northern part of its range' (Peters).

MIGRATION. From older observations of vast flocks arriving in Uttar Pradesh in October (Reid 1887, SF 10: 77), and of flocks of many thousand birds each on the Chenab and Sutlej rivers near Multan in December including one estimated to contain ten thousand individuals (Hume 1873, SF 1: 106), the Spoonbill was well known to be, in part, an abundant winter migrant from extralimital areas. Direct evidence has since been provided by the recovery in India of four Spoonbills ringed as nestlings in the Caspian region of USSR (between c. 40° and 50°N. and 45° and 55°E.) in June-July, as follows: Kolhapur district, Maharashtra, (c. 17°N., 75°E.); Monghyr district, Bihar (c. 25°N., 86°E.); Tonk, Rajasthan (c. 26°N., 76°E.); Mandsaur district, Madhya Pradesh (c. 24°N.,

75°E.). Three of these were recovered between October and January; one curiously enough in July, almost exactly two years after ringing and moreover at the time when our local population here should be breeding. A fifth juvenile ringed near Yeysk, Sea of Azov (46°41'N., 38°15'E.) on 10.vi.1961 was recovered — again almost exactly two years later, in June 1963 — near Hyderabad in W. Pakistan (25°35'N., 68°25'E.).

GENERAL HABITS. Gregarious and sociable. Keeps in small parties and flocks of up to fifty or more, either by themselves or in association with egrets, ibises, and other marsh birds. Feeds more actively in mornings and evenings than during daytime, and is partly nocturnal. Wades into the shallows on the edge of a jheel or swamp and with outstretched obliquely poised, partly open bill sweeps from side to side in the water with a semi-circular scything action, raking the bottom ooze with the tip of the lower mandible as it moves forward. Where food is plentiful a compact, eager, jostling herd will advance almost at a run, working methodically back and forth over a particularly rewarding patch. Bouts of intense feeding activity alternate with pauses of quiescence when the entire herd will stand about listlessly with no apparent interest in food. Flight seemingly rather slow, with deliberate wing flaps — neck and legs extended. Flocks fly in diagonal wavy ribbons, each bird evenly spaced behind and to one side of the one in front.

FOOD. Small fish, tadpoles, frogs, molluscs, crustaceans, aquatic insects. Also some vegetable matter.

VOICE. Normally very silent; in breeding colony occasional short low grunts and bill-clattering.

BREEDING. Colonial. Usually in mixed heronries — sometimes very large ones, e.g. Keoladeo in Bharatpur (Rajasthan) — but with a tendency to segregation. *Season*, variable, depending on early or late monsoon and filling of tanks and jheels; normally July to October in N. India, November to January in S. India, December to April in Ceylon. *Nest*, a variable platform of sticks, sometimes a flimsy pad and at others a fairly substantial structure, lined in varying degree with grass or leaves. Built in clumps of moderate-sized trees (*Acacia arabica*, *Prosopis spicigera*, *Barringtonia racemosa*, etc.) standing partially submerged in a jheel. Rarely in reed-beds. Often many nests in the same tree almost touching one another. *Eggs*, 3 or 4, rarely 5, long ovals slightly pointed at one end, smooth surfaced. Chalky white in colour, sparsely marked with small blotches and spots of light to dark brown, sometimes with faint secondary markings of pale grey-brown or pinkish grey. Average size of 40 eggs 65·6 × 44·2 mm. (Baker). Both sexes take part in nest-building and incubation. Incubation period unrecorded in India; estimated as about 21 days.

MUSEUM DIAGNOSIS

MEASUREMENTS

| | Wing | Bill | Tarsus | Tail |
|--------------------------------------|---------|----------------------------|---------|------------------------|
| ♂ ♀ | 350-395 | 180-228 (from feathers) | 130-165 | 108-122 mm. (Baker) |
| Weight 2 oo? 1770, 1785 gms. (BNHS). | | | | |

COLOURS OF BARE PARTS. Iris dark brown to brownish crimson. Bill, upper mandible black; terminal half of 'spoon' bright yellow; lower mandible slaty grey.

Bare skin of face and throat canary or sulphur yellow, sometimes blotched with black on and above lores. Legs and feet black.

NOTE. The European breeding (nominate) race is only slightly smaller with a smaller bill, but the measurements often overlap. Such examples, and borderline cases, are impossible to assign racially with confidence.

Family PHOENICOPTERIDAE: Flamingos

Large, excessively long-legged marsh birds with very long slender necks and peculiar thick lamellate bills sharply downcurved or 'broken' in the middle. Plumage largely pinkish white and crimson, with black remiges or wing-quills. Tibia bare; toes short and webbed. Sexes alike or nearly so.

ANATOMICAL DETAILS in Witherby 1939, 3: 162-3; Baker 1929, FBI 6: 372; Stresemann 1927-34, Aves: 804-5.

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Key to the Indian forms

- Larger (standing c. 140 cm. = 4½ ft.). Plumage rosy white with scarlet and black wings, upper mandible overlapping lower, throat naked
 *Phoenicopterus roseus*
 Smaller (standing c. 90-105 cm. = 3-3½ ft.). Plumage deeper rose pink, upper mandible not overlapping lower, throat feathered.....
 *Phoeniconaias minor*

Genus PHOENICOPTERUS Linnaeus

Phoenicopterus Linnaeus, 1758, Syst. Nat., ed. 10, 1: 139. Type, by monotypy,
Phoenicopterus ruber Linnaeus

Upper mandible overlapping lower; throat naked. See also under Family.

73. Flamingo. *Phoenicopterus roseus* Pallas

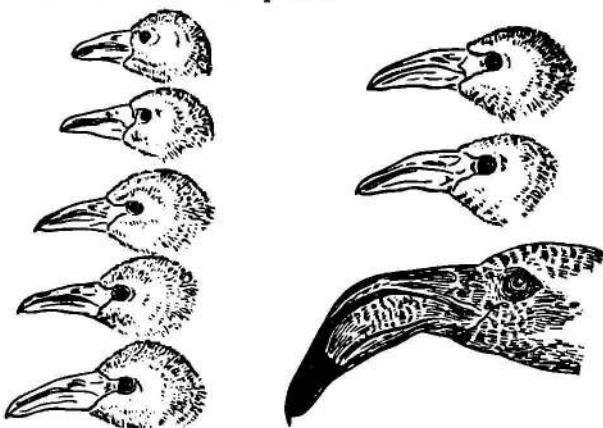
Phoenicopterus roseus Pallas, 1811, Zoogr. Russo-Asiat., 2: 207
 (Mouth of Volga river, south Russia)
 Baker, FBI No. 2241, Vol. 6: 373
 Plate 6, fig. 4, facing p. 112

LOCAL NAMES. *Bog häns*, *Räj häns* (Hindi); *Kānmunthi*, *Kānthati* (Bengal); *Chārdīj bēggō* (Mirshikars, Bihar); *Pu konga*, *Sāmūdrāpū chiluka* (Telugu); *Pūn nārāi*, *Urian* (Tamil); *Siyak kereya* (Sinhala); *Lakkā*, *Lakké jāni* (Sind); *Hänj pākki* (Kutch).

SIZE. Vulture +; standing c. 140 cm. (4½ ft.) to top of head.

FIELD CHARACTERS. A tall, long-legged, long-necked, stork-like marsh bird; rosy white with bright scarlet-and-black wings and massive pink bill

sharply downcurved ('broken') from about half its length. Sexes alike, but female somewhat smaller and paler.



Bills of flamingo chicks showing progressive growth to adult, $\times c. \frac{1}{2}$ (from a photograph of an exhibit of actual specimens arranged by C. McCann)

In flight the large size, long slender outstretched legs and neck, and black-and-scarlet underwing diagnostic.

Young (immature). Overall greyish brown, with brownish bill and dark slaty brown legs. Older birds have more greyish body with dark brown head and bill. Under wing-coverts and axillaries pale pink.

Chick (newly hatched to 2 or 3 days old). Nidifugous; covered with French grey powder-puff down, with soft pale pink bill and short salmon or orange-red legs; both changing to bluish grey in a few days. Very precocious and lively, slithering down from nest mound on alarm and scuttling off unsteadily, balancing itself with stumpy wings, frequently stumbling and rolling over.

STATUS, DISTRIBUTION and HABITAT. Resident, nomadic, and locally migratory. Also extralimital migrant in part. Not uncommon, but capricious and sporadic, in W. Pakistan (Sind) and throughout the Indian Union (rare in Bengal and Assam), East Pakistan (rare) and Ceylon. Not recorded from Nepal. Affects large jheels, brackish lakes and lagoons, salt pans, estuaries, and tidal mudflats on the sea coast.

Extralimital. S. France, S. Spain, parts of N. and E. Africa, the Middle East and Caspian region to W. Siberia, south through Afghanistan.

MIGRATION. Of chicks ringed at the Ashk Island breeding colony in Lake Rezaiyeh, Iran ($37^{\circ}25'N.$, $45^{\circ}30'E.$) between 1970 and 1972, six recovered in India 3 to 5 months after ringing — in Gujarat, Rajasthan, Delhi, Andhra Pradesh and Orissa. This gives some plausibility to McCann's conjecture of 35 years ago that under stress of hydrographic conditions breeding populations may shuttle between the major nesting sites in Europe, Africa, and Asia.

GENERAL HABITS. Highly gregarious, normally in small or large flocks and vast congregations at favourite feeding and nesting places, often numbering many hundred thousand. Feeds in shallow water — usually brackish and even concentrated brine — with head immersed. Sometimes swimming and 'up-ending' like duck in deeper water. The partly open bill is inverted

so that the upper mandible forms a scoop with culmen skimming or scraping the bottom ooze. The fleshy tongue works back and forth like a piston sucking in the water and mud, from which minute organisms are strained out by the lamellae along the edges of the bill. In dense congregations, where individual feeding space is restricted, the bird dabbles around pivoting on itself, the bill action describing a shallow circular trough or moat in the mud around the central 'turntable'. Such feeding circles, c. 60–90 cm. in diameter, almost touching one another, and sometimes many acres in extent, mark the places where flamingos have been feeding. Flight — with fairly rapid wing-strokes, neck fully extended in front and legs trailing well behind — in diagonal wavy ribbons, single file, or in the characteristic V-formation of geese. Rests usually standing on one leg with the long slender neck coiled round, and head tucked in feathers of back.

FOOD. *Chironomus* larvae, small molluscs and crustaceans (e.g. *Artemia salina*), tiny seeds of lacustrine plants (e.g. *Ruppia* spp., *Scirpus*), and organic mud. Possibly also small fish on occasion, e.g. *Cyprinodon dispar* which is very abundant in the bird's haunts in the Rann of Kutch.

VOICE. A single hoarse brassy goose-like honk. A constant babbling while feeding in company.

BREEDING. *Season*, in the Great Rann of Kutch, the only known nesting ground within our limits, variable, depending on hydrographic conditions, September/October to March/April. *Nest*, a truncated conical mound with shallow pan-like depression at top, from a few centimetres to half a metre high, of sun-baked mud scraped up from the vicinity when in semi-liquid condition, and daubed on. Built in hundreds close to one another in a compact, expansive 'city' covering several acres. Sometimes a merely slightly raised bed of mud pellets constitutes the nest. *Eggs*, normally 1 — occasionally 2 — rather like huge eggs of cormorants, from skim-milk to pale blue in colour overlaid with calcium deposit. Average size of 100 eggs, measured by Jourdain, 88·8 × 54·5 mm. (Baker). Three eggs from the Rann of Kutch measured 83 × 50, 83 × 53, 93 × 58 mm. (SA), falling within the maxima and minima of the above.

Both sexes take part in incubation. Period elsewhere stated as 30 to 32 days. Newly hatched, and small chicks, fed by parent on drops of a clear liquid from its bill tip, of unknown origin and composition. (For further accounts of ecology, bionomics etc. consult References under Family.)

MUSEUM DIAGNOSIS

MEASUREMENTS

| | Wing | Bill | Bare tibia | Tarsus | Tail | |
|-----|---------|------------|------------|------------|---------|-------------------------|
| ♂♂ | 393–444 | c. 139–164 | c. 220–250 | c. 311–327 | 152–189 | mm. |
| ♀ ♀ | 375–405 | c. 120–143 | — | — | — | (from feathers) (Baker) |

A Kutch ad. ♂ (measured in the flesh) Wing 464; bill (from skull) 134; tarsus 324; tail 167 mm. (SA).

Weight 3 oo? 2020–3100 (av. 2481) gm. (BNHS).

COLOURS OF BARE PARTS. Iris lemon-yellow. Bill, facial and gular skin pale pink to rich strawberry-ice colour, the first with black tip. Legs and feet variable pink, like bill.

Genus *PHOENICONAIAS* Gray

Phoeniconaias Gray, 1869, *Isis*: 440. Type, by monotypy, *Phoenicopterus minor* Geoffroy

Upper mandible not overlapping lower; throat well feathered.

74. Lesser Flamingo. *Phoeniconaias minor* (Geoffroy)

Phoenicopterus minor Geoffroy, 1798, *Bull. Soc. Phil. Paris*, 1: 98 (East Africa)

Baker, FBI No. 2242, Vol. 6: 375

Plate 6, fig. 5, facing p. 112

LOCAL NAME. *Chhōta rājhāns* (Hindi).

SIZE. Large duck; standing c. 90–105 cm. (3–3½ ft.) to top of head.

FIELD CHARACTERS. Smaller size, deeper rose-pink plumage, and dark coloured bill with crimson feathers around its base, distinguish it from its larger relative. Sexes more or less alike; female somewhat smaller and paler without crimson on back or breast.

In flight, crimson and black underwing, comparatively thicker neck, shorter trailing legs, and goose-like flight are leading pointers.

Young (immature). Overall greyish brown as in the larger flamingo with shorter, darker bill.

Chick. Pale grey natal down replaced by coarser growth in a few days. Colour of bill and legs at hatching pale pink and orange respectively; when slightly older, black.

STATUS, DISTRIBUTION and HABITAT. Status uncertain. Recorded practically in all months, but so far not found breeding within our limits. Largely seasonal (?) visitor with erratic local movements. W. Pakistan and NW. India — Sind, Rajasthan, Gujarat, and the western Gangetic Plain. The Sambhar Salt Lake (Rajasthan) and the Little Rann (Gujarat) are two of its strongholds where vast concentrations, tens of thousand strong, occur irregularly. Stray specimens taken as far south as Bombay (Sálim Ali & Abdulali, JBNHS 40: 649), and Secunderabad, Andhra (Butler, SF 9: 436), and Chilka Lake, Orissa (January 1967) where reported as casual in winter but frequent. More restricted to salt and brackish lakes and tidal lagoons than large flamingo.

MIGRATION. No definite data.

GENERAL HABITS. Gregarious; large concentrations of the two species frequently together. Differs from the large flamingo chiefly in its ecological preference for heavily saturated brine and its feeding technique consequent upon the bill structure being specially adapted for filtering microscopic organisms (see Jenkin, loc. cit.). Usually walks along, or swims, in 30 to 45 cm. depth of still water swinging head from side to side in a scything motion, sucking in the algae from the surface layer (Brown, loc. cit.). However, in shallow brine only a few centimetres deep, e.g. in salt pans and in the Little Rann of Kutch, the bird feeds in the same way as its larger relative, partly or entirely submerging the head and inverting the bill. The difference in the size of food for which the bills are respectively adapted doubtless enables the two species to co-exist side by side without competing.

FOOD. Almost exclusively algae and diatoms. Occasionally insect larvae and copepods. Regularly drinks fresh water.

BREEDING. Long suspected in Little Rann of Kutch from presence of vast numbers of immature birds in brown plumage accompanying adults. Actual

nesting first discovered only in January 1974 on the periphery of Flamingo City in the Great Rann — an estimated 3–400 nests with eggs and/or chicks. For details see Sálim Ali, 1974, JBNHS 71(1): 141–4. *Nests*, downy hatchlings and older pulli indistinguishable from those of the larger flamingo. *Eggs*, similar but averaging smaller, 78·5 × 49·3 mm. (Leslie Brown). Breeds abundantly on the soda lakes in East Africa.

MUSEUM DIAGNOSIS

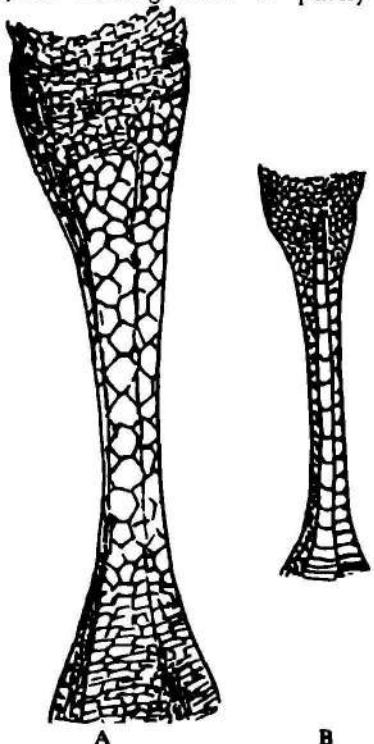
| MEASUREMENTS | Wing | Bill (from feathers) | Tarsus | Tail |
|--------------|---------|-------------------------|------------|----------------|
| ♂♂ | 329–354 | 100–118 | c. 190–242 | c. 120–142 mm. |
| ♀♀ | 310–325 | c. 93–104 | — | — (Baker) |

COLOURS OF BARE PARTS. Iris red. Bill dark lake-red with black tip. Legs and feet red.

Order ANSERIFORMES

Family ANATIDAE: Ducks, Geese, Swans

A group of large, conspicuous water birds perhaps more generally known and recognized than any other, even by persons whose interest in birds does not extend beyond hunting them or purely as edibles. By virtue of the regularity of their seasonal appearances and disappearances, their spectacular flights, and their abundance and widespread occurrence in winter on all types of inland waters throughout the country, they perhaps also provide the most tangible example to the popular mind of the phenomenon of bird migration.



Tarsus of Greylag Goose (A) and Mallard (B) to illustrate reticulated tarsus of swans and geese and partially scutellated tarsus of ducks

SIZE. Very diverse, from considerably larger than a Vulture (swan) to about that of a Pigeon (Cotton Teal). Colour from wholly white (swan) to combinations of grey, brown, black, and green with metallic reflections in many attractive patterns. Most ducks with conspicuous metallic 'speculum' or white patch on wing. Bill typically broad, flat, rounded at tip, and with a comb-like fringe or lamellae for straining out food particles from water in which they chiefly feed. Wings in most species rather narrow and pointed, adapted for swift and long-ranging flight. Tail short. Legs short; feet webbed. The majority of our species are migratory, originating from the Palearctic Region (see map, p. xxxvii).

FOOD. Animal and/or vegetable matter. Obtained in water, marshes, or meadows and fields by dabbling, diving, or grazing.

BREEDING. On ground, in holes in ground, or hollows in tree-trunks, etc. Young nidifugous, down-covered.

ANATOMICAL DETAILS. Witherby 1939, 3: 167; Stresemann 1927-34, Aves: 794-97; Baker 1929, FBI 6: 377-8.

CLASSIFICATION and TAXONOMY. Delacour, J. and Mayr, E. 1945, 'The Family Anatidae.' *Wilson Bulletin*, 57: 3-55; Ripley, S. D. 1961, *A Synopsis of the Birds of India and Pakistan*, pp. 25-40; Peters, J. L. 1931, *Check-list of Birds of the World*, 1: 143-89.

GENERAL BIOLOGY: Delacour, J. 1964, *The Waterfowl of the World*, Vol. 4.

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Key to the Genera

| | Page |
|---|----------------|
| A Hind toe not lobed..... | 1 |
| B Hind toe very narrowly lobed..... | 2 |
| C Hind toe broadly lobed..... | 3 |
| I Neck as long as, or longer than, body..... | Cygnus |
| Neck not as long as body..... | a |
| a Plumage on sides of neck longitudinally furrowed, tail white or tipped with white..... | Anser |
| Plumage on sides of neck unfurrowed, tail not tipped with white | I |
| I Distance from tip of bill to gape slightly more than one-half length of tarsus..... | Branta |
| Distance from tip of bill to gape as long as or longer than tarsus | a ¹ |
| a ¹ Underparts white | Sarkidiornis |
| Underparts not white | b ¹ |
| b ¹ Upperparts shiny blue-green..... | Cairina |
| Upperparts brown | Rhodanessa |
| 2 Bill short and goose-like..... | b |
| Bill rather flat and broad..... | c |
| b Head crested, primaries edged with silvery grey..... | Aix |
| Head not crested, primaries not edged with silvery grey..... | |
| | Nettapus |
| c Lower portion of tarsus in front reticulated, primaries equal to secondaries in length..... | Dendrocygna |
| Lower portion of tarsus in front scutellated, primaries considerably longer than secondaries..... | II |
| II Entire outer web of inner secondaries chestnut..... | Tadorna |
| Outer web of inner secondaries not chestnut* | Anas |

* not to be confused with the tips of secondary coverts which are chestnut in several species of *Anas*.

| | Page |
|--|-------------------|
| 3 Bill long and thin with saw-like teeth on edges of both mandibles | <i>Mergus</i> 200 |
| Bill not like above.....d | |
| d Tail feathers narrow and very stiff..... <i>Oxyura</i> | 208 |
| Tail feathers normal.....III | |
| III Under wing-coverts dark.....a* | |
| Under wing-coverts white or whitish.....a* | |
| a* Nostrils situated on culmen about one-third of the distance from base to tip..... <i>Clangula</i> 196 | |
| Nostrils situated on culmen about two-thirds of the distance from base to tip..... <i>Bucephala</i> 198 | |
| a* Width of culmen becoming narrower towards tip, lamellae coarse and prominent | <i>Netta</i> 177 |
| Width of culmen becoming broader towards tip, lamellae fine and not prominent..... <i>Aythya</i> 179 | |

Genus *BRANTA* Scopoli

Branta Scopoli, 1769, Annus I, Hist. Nat.: 67. Type, by subsequent designation, *Anas bernicla* Linnaeus (Bannister, 1870)

Bill very small with no serrations visible on the edge of the upper mandible as in *Anser* q.v. For further particulars see Delacour, 1: 145.

75. Redbreasted Goose. *Branta ruficollis* (Pallas)

Anser ruficollis Pallas, 1769, Spic. Zool., fasc. 6: 21, pl. 4 (Lower Ob, Southern Russia)
Baker, FBI No. 2259, Vol. 6: 407

LOCAL NAMES. None recorded.

SIZE. Domestic duck ±; length c. 61 cm. (24 in.).

FIELD CHARACTERS. A small brightly coloured goose, largely black and chestnut, strikingly marked with white.

Adult. *Above*, crown, dorsal side of neck, back and rump black, with two conspicuous grey bars on closed wings. Sides of head and face boldly patterned with white and chestnut. *Below*, ventral side of neck and upper breast bright chestnut separated from black hindneck and black lower breast by running white bands. Abdomen, vent, and a broad horizontal band on flanks white. Sexes alike.

Young (immature) has the black parts browner and duller and the chestnut parts paler and more cinnamon.

STATUS, DISTRIBUTION and HABITAT. Rare straggler. Has only been observed thrice within our limits: once in Madhya Pradesh in 1836 (Hume 1880, SF 8: 421) and twice in Assam on the Brahmaputra river (Baker); not more recently than 1907.

Extrazonal. 'Breeds on the Siberian Tundra from the Ob to the Khatanga. Winters in the southern part of the Caspian Sea and the Aral Sea' (Peters).

GENERAL HABITS. See Delacour, 1: 181. Nothing recorded in India.

MUSEUM DIAGNOSIS

MEASUREMENTS

| | Wing | Bill | Tarsus | Tail |
|-----|---------|-------|--------|---------------------------|
| ♂ ♀ | 342-363 | 23-27 | 52-58 | 100-110 mm. (Delacour) |

COLOURS OF BARE PARTS. Iris hazel to brown, 'chestnut' (Witherby). Bill and legs black (Baker).

Genus ANSER Brisson

Anser Brisson, 1760, Orn. 1: 58, 6: 261. Type, by tautonymy, *Anser domestica* = *Anas anser* Linnaeus

Bill short and high at base; nostrils situated half way between base and tip, the latter furnished with a nail-like dertrum. Tarsus fairly long and strong. Wing long and pointed. Tail short and rounded, of sixteen to eighteen feathers.

Key to the Species

| | | Page |
|---|--|-----------------------|
| A | Head white with two black bands at nape..... | <i>A. indicus</i> |
| B | Head dark..... | 1 |
| I | Nail of maxilla black..... | <i>A. fabalis</i> |
| a | Nail of maxilla white..... | a |
| a | No white or very little white on forehead; rump grey, legs pink..... | <i>A. anser</i> |
| a | Considerable white on forehead and around base of bill; legs reddish-flesh to orange-yellow..... | I |
| I | Wing over 380 mm..... | <i>A. albifrons</i> |
| a | Wing under 380 mm; swollen yellow ring round eye..... | <i>A. stylopterus</i> |
| | | 129 |
| | | 126 |
| | | 128 |

ANSER FABALIS (Latham)

Key to the Subspecies

Bill and legs orange-yellow, occasionally pink

Wing 440-562 mm., bill 64-87 mm..... *A. f. middendorffii*

Wing 405-462 mm., bill 51-66 mm..... *A. f. rossicus*

76. Forest Bean Goose. *Anser fabalis middendorffii* Severtzov

Anser middendorffii Severtzov, 1873, Vert. goriz. rostrostr. tark. zhiv.: 149 (Sibérie Orientale = Oudskoi Ostrog.). (= *sibiricus* Alphéraky)

77. Tundra Bean Goose. *Anser fabalis rossicus* Buturlin

Anser serrirostris rossicus Buturlin, 1933, Opredelitel promyslovikh pitz. d. h. Best, Buch der jagdbaren Vögel: 60 (West Siberian Tundra. Locality restricted by Dementiev, 1936, Alauda: 190, to Beluchia Guba, Jamal, Taimyr).

Baker, FBI No. 2256, Vol. 6: 403 (= *A. neglectus*)¹

¹ Sushkin's Goose, *A. f. neglectus*, recorded in winter from Assam, is now considered merely a colour phase of the mixed population *A. fabalis-rossicus* (with pink bill and legs) breeding in northern USSR.

SIZE. Domestic goose ±; length c. 76 cm. (30 in.).

FIELD CHARACTERS. A large brown goose with an elongate body, long neck, and longish slender bill making somewhat straight line with forehead; black on basal half, yellow or pink on terminal half. Distinguished from the Eastern Greylag, which it resembles, in being less grey more brown, with uniformly dark brown head and neck contrasting with lighter breast and back. Also by longer neck, less tubby body, and slenderer and longer *particoloured* bill *contra* all pink in Greylag.

STATUS, DISTRIBUTION and HABITAT. Vagrant. Three specimens ('*neglectus*') recorded from Assam by Baker. Possibly both forms occur less rarely in winter, but unidentified.

Extralimital. *A. f. middendorffii* breeds in forests of eastern Siberia from the Khatanga to the Kolyma, south to the Altai. Winters in eastern China, northern Mongolia, and Japan.

A. f. rossicus breeds in Novaya Zemlya and on tundra shores of Arctic Russia and Siberia west of the Taimyr Peninsula. Winters in Europe south to Italy; in Asia to Turkestan and China.

MUSEUM DIAGNOSIS. *A. f. rossicus* differs from *A. f. middendorffii* in being somewhat stockier and less elongate in body, with the bill shorter and higher at base. Lower mandible deep and distinctly curved outward, the nail at tip long, oval, and tapering (*contra* lower mandible straight and nail rounded in *middendorffii*). Normally no narrow band of white feathers around base of bill in either.

MEASUREMENTS

A. f. middendorffii ♂♀ Wing 440–562; bill 64–87 mm.; visible depth of lower mandible 7–10 mm.

A. f. rossicus ♂♀ Wing 405–462; bill 51–66 mm.; visible depth of lower mandible 7–10 mm.

COLOURS OF BARE PARTS. Iris brown. Terminal half of bill, legs and feet orange-yellow; often pink in *rossicus*.

[*Synopsis* (p. 26) includes the Pinkfooted Goose, *Anser fabalis brachyrhynchus* Baillon, in the Indian avifauna chiefly on the basis of the record of one shot in Bikaner, Rajasthan, in December 1948 (JBNHS 46: 186–7). The identity of the specimen mentioned by Baker (Fauna 6: 403) as taken by his collector in the Surma Valley, Assam, was doubted by Dr C. B. Ticehurst (JBNHS 34: 489) who pointed out that this goose has a limited and distinctly western distribution in winter and not a single record was known even so far east as European Russia. Baker's specimen is apparently non-existent, but the one from Bikaner in the BNHS collection has been re-examined by Mr Humayun Abdulali and one of us (SDR) and proves in fact to be a young Whitefront, *Anser albifrons albifrons*. In the absence of any specimens from India therefore, *Anser f. brachyrhynchus* must be deleted from the Indian list and Baker's record of '*neglectus*' from Assam treated with cautious disbelief!]

79. Whitefronted Goose. *Anser albifrons albifrons* (Scopoli)

Branta albifrons Scopoli, 1789, Annus I, Hist. Nat.: 69 (North Italy)

Baker, FBI No. 2253, Vol. 6 : 399

Plate 8, fig. 2, facing p. 160

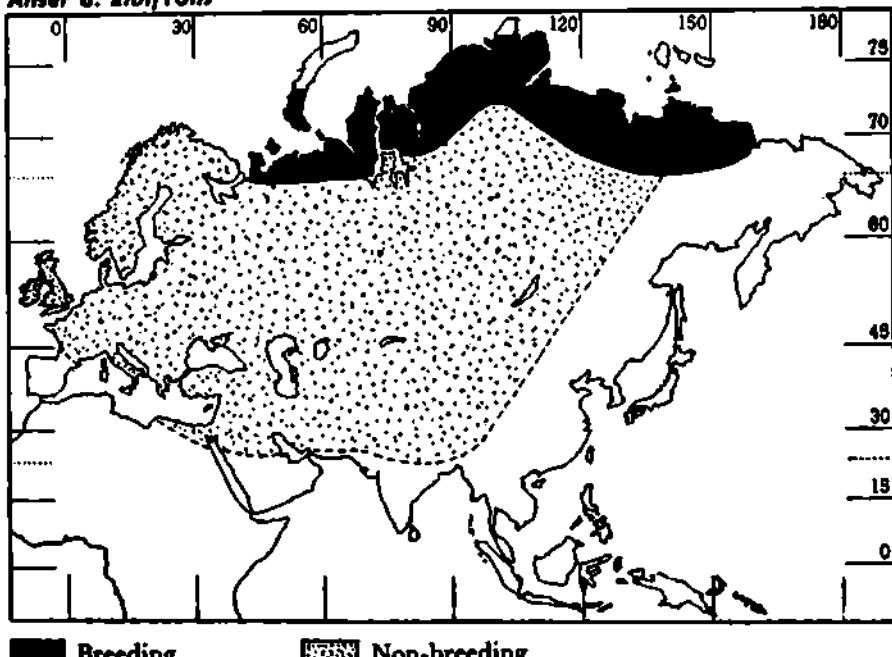
LOCAL NAMES. Unrecorded.

SIZE. Greylag Goose — ; length c. 68 cm. (27 in.).

FIELD CHARACTERS. Darker and considerably smaller and daintier than the Greylag, with a much shorter (pinkish) bill. A diagnostic white patch on forehead (from base of bill), and irregular coarse black barring on lower breast and flanks. Rump dark greyish brown *contra* grey in Greylag. Legs orange. Sexes alike.

STATUS, DISTRIBUTION and HABITAT. Sparse and rare winter visitor to West Pakistan, NW. India (including Kutch and Rajasthan¹, and across the Gangetic Plain (U.P.) to Assam and Manipur). Southernmost record in India from Chilka lake, Orissa, c. 19°40'N. (Craven, JBNHS 48: 365-6).

Anser a. albifrons



Breeding

Non-breeding

Extralimital. Breeds on the Arctic coasts of Europe and Asia, east from the Kanin Peninsula, Kolguev, and southern Novaya Zemlya to the Kolyma river and perhaps beyond. Winters in W. Europe, shores of the Mediterranean, Black, and Caspian seas to China and Japan (Peter Scott). Also in N. Iraq (C. D. W. Savage).

GENERAL HABITS. On the whole very similar to the Greylag. Has a reputation for ability to rise almost vertically from the ground on sudden alarm or disturbance, and to get out of gunshot faster than any other goose.

VOICE. Described as a high-pitched musical disyllabic honking, whence known as 'Laughing Goose' in many countries.

MUSEUM DIAGNOSIS. For full description of plumages etc. see Witherby 1939, 9: 188.

¹ The bird shot in Bikaner in December 1948 and recorded (JBNHS 46: 186-7) as *Anser fabalis brachyrhynchus*, proves on re-examination to be an immature of this species.

MEASUREMENTS

| | Wing | Bill (from feathers) | Tarsus | Tail |
|-----|---------|-------------------------|--------|-------------|
| ♂ ♂ | 392-442 | 43-52 | 60-71 | 114-132 mm. |
| ♀ ♀ | 380-421 | 43-47 | — | — |

Extremes for European birds:

| | | | | |
|-----|---------|----------------------|-------|-------|
| ♂ ♀ | 369-450 | 40-55 (nail 8-15) | 55-80 | — mm. |
|-----|---------|----------------------|-------|-------|

Weight c. 2 - 3 kg.

(Witherby)

COLOURS OF BARE PARTS. Iris brown. Bill flesh colour or pale orange-yellow to rosy flesh colour, the nail paler and whiter. Legs and feet reddish flesh colour to orange-yellow, the webs paler; claws whitish (Baker).

80. Lesser Whitefronted or Dwarf Goose. *Anser erythropus* (Linnaeus)

Anas erythropus Linnaeus, 1758, Syst. Nat., ed. 10, 1: 123 (North Sweden)

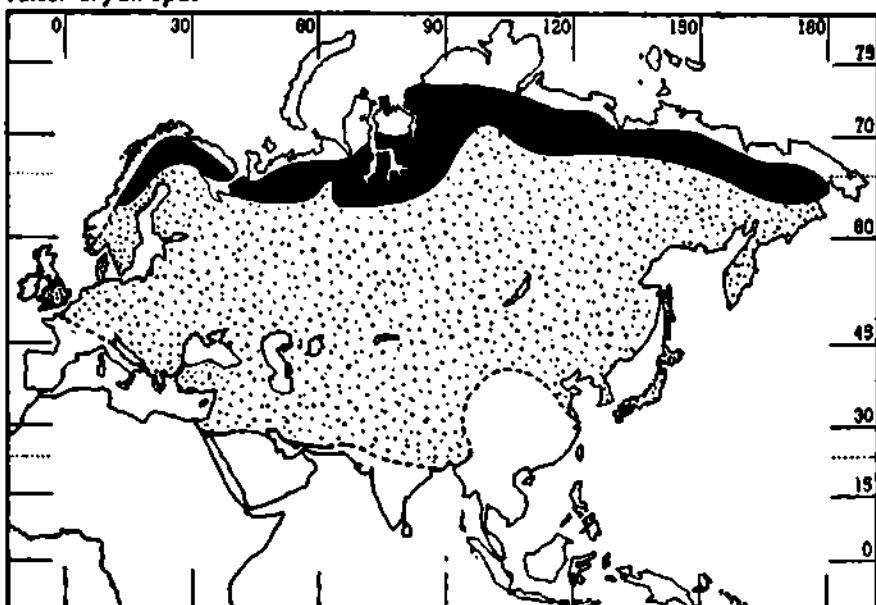
Baker, FBI No. 2254, Vol. 6: 401

LOCAL NAMES. Unrecorded.

SIZE. Duck ±; c. 53 cm. (21 in.).

FIELD CHARACTERS. Like the Whitefronted, *A. albifrons*, but considerably smaller, dark brown, also with blotchy black bars on lower breast and belly, with a round shaped head and proportionately much shorter pink bill. The more extensive white forehead patch, reaching to top of head between the eyes, and the conspicuous swollen ring of yellow skin around

Anser erythropus



Breeding

Non-breeding

the eye are diagnostic features which, on a satisfactory view, should settle all doubt. Sexes alike.

STATUS, DISTRIBUTION and HABITAT. Rare and sparse winter visitor. Recorded sporadically from West Pakistan (Sind, the former NWFP), Kashmir, Uttar Pradesh, Bengal, Bihar, and Assam. Has strayed as far south as Maharashtra, Poona district (Trevener, JBNHS 28: 1081).

Extralimital. Breeds largely on mountain tarns from Norwegian Lapland to the Kolyma in Siberia, and perhaps further eastwards. Winters in south-eastern Europe, Black and Caspian seas, Middle East (Iraq, Iran), Seistan, Turkestan, China and Japan.

GENERAL HABITS. Usually congregates in large flocks in its regular winter quarters, e.g. around the Caspian and in northern Iraq. In India recorded only in twos and threes, separately or mixed up with flocks of Greylags.

VOICE. Described as resembling that of *A. albifrons* but much higher pitched and more squeaky.

MUSEUM DIAGNOSIS. In the hand an additional point for differentiation from *albifrons* is that the 'teeth' or serrations are concealed when the bill is shut. For details of plumages etc. see Witherby 1939, 3: 192.

MEASUREMENTS

| | Wing | Bill (from feathers) | Tarsus | Tail |
|-----------------|---------|-------------------------|--------|------------------------|
| ♂ ♂ | 367-388 | 28-35 | 58-62 | 95-109 mm. |
| ♀ ♀ | 352-381 | 32-35 | — | — |
| (Witherby) | | | | |
| Extremes | | | | |
| | Wing | Bill | | |
| ♂ ♀ | 340-390 | 30-45 | | (J. Berry in Witherby) |

COLOURS OF BARE PARTS. Iris brown. Bill pink. Legs orange-yellow (Delacour).

81. Eastern Greylag Goose. *Anser anser rubrirostris* Swinhoe

Anser cinctus var. *rubrirostris* Swinhoc, 1871, P.Z.S.: 416, ex Gray, 1846, Cat. Bds. Nepal, 144, nom. nud., ex Hodgson, 1844, Zool. Misc.: 86, nom. nud. (Shanghai)

Baker, FBI No. 2252, Vol. 6: 398

Plate 4, fig. 4, facing p. 64

LOCAL NAMES. *Sona*, *Karria sona*, *Häns*, *Rāj häns* (Hindi); *Rāj häns* (Bengal); *Kāj* (Bihar); *Kallauk*, *Khar häns* (Bhagalpur); *Mogdla*, *Mogdla bāttāk* (Nepal terai); *Kāng ngā* (Manipur); *Rāj häns*, *Dhitraj* (Assam); *Gāj* (Kutch); *Hānj* (Sind).

SIZE. Domestic Goose ±; length c. 81 cm. (32 in.).

FIELD CHARACTERS. Very like the normal ashy brown phase of the domestic goose. Pale or French grey rump, white upper tail-coverts, and white nail to pink bill diagnostic.

In flight the comparatively pale head, and pale grey leading-edge of the wing next the body, are additional pointers. Sexes alike.

STATUS, DISTRIBUTION and HABITAT. Winter visitor. Common in West Pakistan (Sind, the former NWFP), Kashmir¹, Punjab, in small numbers in

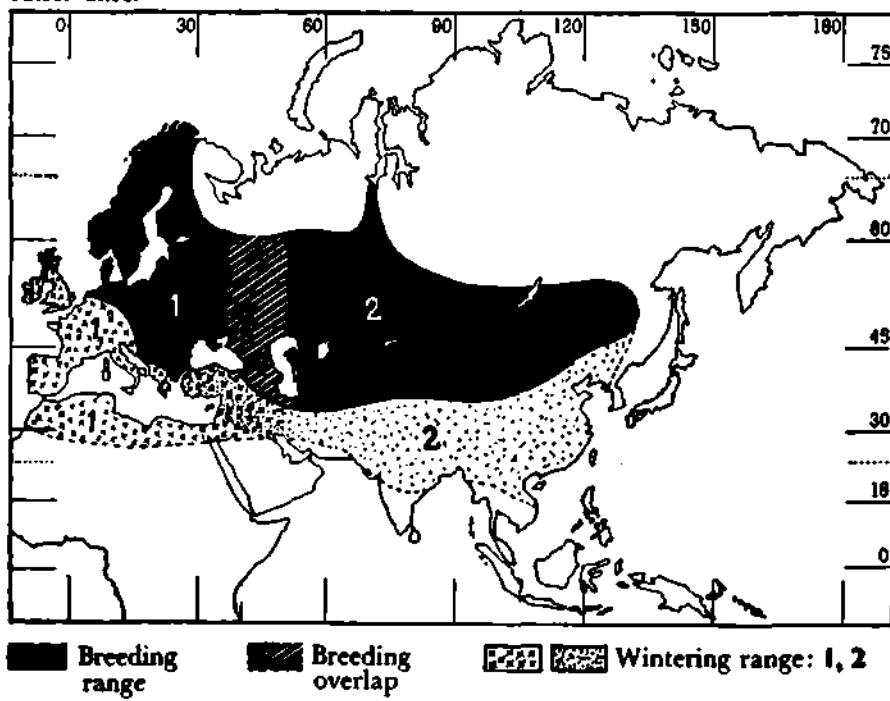
¹ A white goose shot by Col. H. Nedou and published (JBNHS 49: 311) as the first record in India of the Snow Goose, *Anser caerulescens*, was wrongly identified. It proves to be a partial albino Greylag.

Rajasthan, N. Gujarat, Nepal terai, and across the Gangetic Plain to Assam, Manipur (abundant on Logtak lake), and East Pakistan. Abundant on the Chilka lake, Orissa, in some winters. Rare in Madhya Pradesh; virtually absent in the Deccan and S. India. Only once in Ceylon.

Extralimital. Breeds eastwards from c. 40°E. and south of 60°N., through Asia Minor and central Asia to Kamchatka. In winter to the eastern Mediterranean, Black and Caspian seas, and in Seistan and China (Peter Scott).

MIGRATION. Little precise data. Normally arrives in large skeins (from central Asia?) through the NWFP and Kashmir in October/November, (sometimes as early as first half September) spreading out by December. Has been observed migrating (this and/or Barheaded Goose) at over 4,270 m. (14,000 ft) alt. across the Himalayas in this sector. Practically all have left by mid March. Birds ringed in Bharatpur, 27°14'N., 77°28'E., recovered in Kazakh SSR and Mongolian People's Republic, between c. 48° and 50°N. and 82° and 92°E. For details see JBNHS.

Anser anser



1 *A. a. anser*; 2 *A. a. rubirostris*

GENERAL HABITS. Highly gregarious. Congregates in considerable flocks on the larger jheels particularly in the north-west (e.g. Manchar and Haigam lakes in Sind and Kashmir) wherever abundance of food, comparative freedom from molestation, and extensive cultivation of winter crops in the surroundings supply the essential requirements. Family parties or larger gaggles spend the daytime squatting belly to ground or resting on one leg on mud-spits in jheels and rivers or amidst open fields, or floating listlessly on the water with head tucked in the feathers of the back. But the birds are always uncannily vigilant and alert and can seldom be taken unawares. They