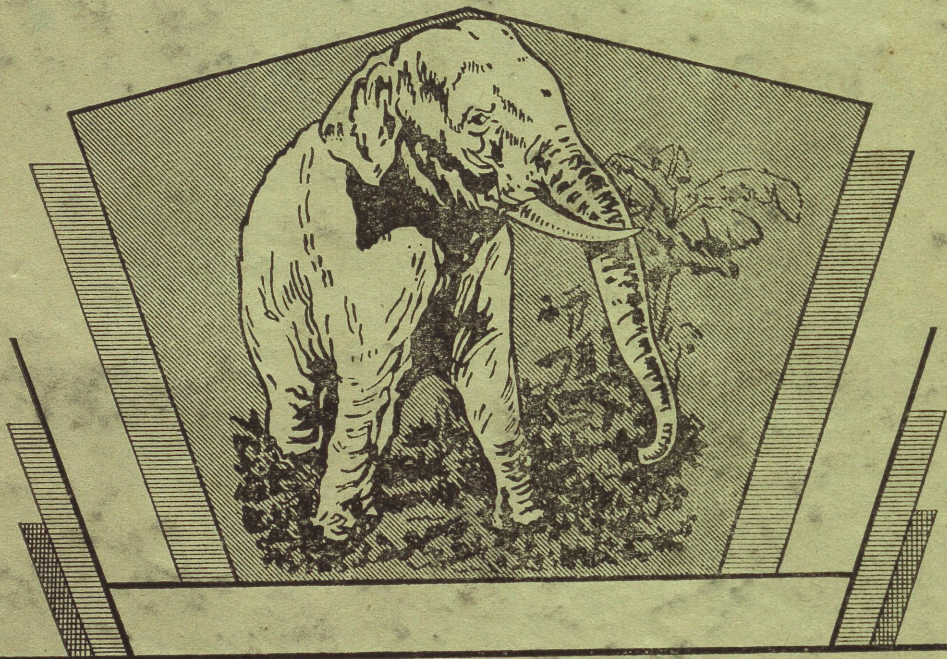


The **ELEPHANT**

200
NO. 6

EXERCISE BOOK

MADE FROM
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CALCUTTA



Name _____ *Class* _____

Subject _____

Jan

MAIN LINES
OF
STUDY

The main lines of field ornithological studies in Bihar relate in the first instance to the making of a geographical tally list by districts. This could later on be followed by the publication of an all-illustrated book on birds of Bihar. Such a book should be expected to attract at least 5 to 6 amateur bird watchers in each district. Then a check-list could be printed and distributed and some really sustained intensive work could be done.

The book, however, itself must indicate the main lines of study and include at least preliminary work on those lines.

Therefore, after geographical tally list by districts, the main items of study are:

- (i) status, and
- (ii) migration.

Both these items are closely related to the district-tallies and so have to be studied along with-

Under the broad heading of Status, the principal thing to be found about each species is whether it is RESIDENT or MIGRANT, for the province as a whole or for particular districts.

RESIDENT

Among resident species, there would be a great number which are more or less resident in all the 16 districts. These can be stated as constituting the stable avifauna of the province.

The other resident-forms can be classed as:

- i) Patchily distributed; their scattered occurrence not enabling any explanation of their distribution; Most-rare and

scarce species will be such.

(ii) Peripheral extensions:

- I { (a) Himalayan species found in Champaran
Sivaliks, and other areas in North-Bihar;
(b) Terai species found in North-Bihar Plains;
(c) Duars species found in Purnea.
- II { (d) Central Indian species found in Shahabad,
Palamau and Western Ranchi;
(e) Peninsular hill species found in Palamau
and Ranchi;
(f) Eastern Ghats, Orissa and Southern species
found in Singhbhum.
- III { (g) Any Burma, Assam or East-Bengal species
that may be found in the Eastern districts of
Purnea, Sarlāl Pargana, Manbhum & Singhbhum.

(iii) Link occurrences: species found in
Western Ghats and Himalayas, but also found
in Bihar. Refer to Salim Ali's pamphlet and

letter on the subject.

(iv) Species that are found only in (a) plains areas, (b) hill areas, or (c) are restricted to one side of the Ganges. Here study of sub-species may later become necessary.

(v) Very localised species.

MIGRANT:

When we talk of bird migration, generally we mean the large-scale and long-distance phenomena. We have a large number of such visitors, mostly in winter. So we shall divide the migrants as follows:

(i) Winter visitors:

(a) On rivers, Ghats, Water-stretches, etc

(b) On land

(c) Mountain-top migrants (see Hill Birds)

(ii) Summer visitors — Southern or peninsular birds breeding in Bihar and leaving

for southern areas in winter.

(iii) Passage Migrants

(iv) Local migrants

(a) ascending hills like Parasnath in Summer for breeding and descending in winter.

(b) making non-altitudinal local migrations for nesting and breeding.

From this brief outline it would be clear that after a general work for the territory, specialised studies of the following areas is necessary.

1) Champaran hills → especially in winter.

2) Rajmahal hills

3) Parasnath hill → especially in winter.

4) Nalānkat Plateau → summer

5) Kothari & Saranda area, generally

status also may call for observations of the following types: (a) relations of status

between two species of the same or closely-related genera;

b) distribution and status of the three species of fantail flycatchers,

c) distribution and status of the different Golden Backed or Black backed Woodpeckers.

TAGS:

R = Resident x

RT = Resident Throughout

RI = Resident Isolatedly

RP = Resident Peripheral:

- (i) RPH = Resident Peripheral Himalayan
- (ii) RPP = Resident Peripheral Peninsular
- (iii) RPA = Resident-Peripheral Assam

V = Visitor x

WV = Winter Visitor, which come to Bikaner having bred in the North.

- SV = Summer visitor, which come to Bihar for breeding
- MTM = Mountain Top Migrant
- L = Link Occurrence
- PMS = Passage Migrant spring, visiting Bihar
en route - southward return journey in spring
- PMA = Passage migrant Autumn, visiting Bihar
en route - southward areas in Autumn
- PMB = Passage migrant both seasons

Outline for a book "Birds of Bihar"

1. A check-list of Birds found in Bihar with the field characters of all the species given, with also references to coloured and monochrome illustrations available in different books.
2. Give as additional help to identification voice, and general habits.
3. The main list under the head "Distribution" should give enough material to enable check lists to be made for each district.
4. Give a habitat-break-down and also of biotopes.
5. Indicate new lines of study (1) Display, (2) Status, (3) Territory and (4) Breeding calendar.
6. Give a bird calendar.
7. Food Habits + Economic importance. The

latter according to broad heads Agriculture
and forestry.

An outline of a proposed book entitled:
Bird life in Bihar

1. The need for regional, provincial and state-airfauna texts arises out of the fact that the novice has no book to lead him from the popular all-India handbooks to the F.B.I. Let us consider the case of a person who has been watching birds in a particular locality, say one district or one state. He has been using either Whistler or Salim Ali's illustrated handbooks, or both of them (supplemented with Salim Ali's Hill Birds) and has learnt to recognise about 200 birds or so, but in his own locality he comes across numerous birds whom he cannot identify except by reference to F.B.I. The disadvantages of the F.B.I. are that it is a costly publication, is not readily available,

it does not have illustrations of each species it describes, and the descriptions are not in terms of field characters but of hand specimens. The book was written over 20 years ago.

2. therefore, there must be books to enable a bird-watcher to graduate from the books describing the all-India common forms to all the birds of a particular area. Such books can be so prepared that they are of modest size and price and illustrate all the bird forms found in a particular state or region.

3. Now the proposed book will serve that purpose. It will aim at describing all the ⁴ ~~600~~ or so birds reported from Bihar; it will carry coloured illustrations of at least 400, photographs and black and white drawings of at least another 200. Only field characters will be described.

4. In order to enable bird-watchers in the

Contiguous areas of West-Bengal, Orissa, Uttar Pradesh and Madhya Pradesh to benefit from this boon (and so give the book a wider and regional appeal) the distribution of birds common to Bihar and any of those states will be mentioned. That way the book shall become an excellent field manual for observers in the region lying between a rectangle bounded on the east by the Hooghly and the Ganges, on the north by the Himalayas, on the south by the Bay of Bengal and on the west by the 82nd Longitude, approximately one-tenth of the total area of India x

5. However, there should be no intention to confine the book to the five states mentioned above x the information in regard to the distribution of each species found in Bihar (area nearly 70,000 square miles) shall be

entered under three heads:

- (a) distribution in Bihar by districts in detail;
- (b) distribution in India (i) Contiguous states as far as possible by districts though in less detail than (a); and (ii) in non-contiguous states
- (c) distribution outside India x

By this method till other regional hand books come out this book should be of use to all watchers in Peninsular India x

6. The book will be divided into two parts:
- (I) Identification
 - (II) Details of distribution

ILLUSTRATIONS

1. Shall follow the system of Salim Ali's Hand book of Indian Birds by giving a page of text to a facing page of Coloured illustration to all species that are generally found in more than six districts x

2. Allétempt- shall also be made to give Coloured illustrations of all birds which have been reported from each of the three broad geographical areas of the State- i. e. North Bihar, South Bihar and Chotānagpur.
3. Generally it should be possible to obtain Coloured and other illustrations for use on loan, except- for those species whose Coloured plates do not- exist- or are difficult- to get x
4. Resources will be devoted towards getting Coloured illustrations of at least- 200 species whose Coloured representations are not- found in popular books or which do not- exist- x that will- be the main contribution of this book x
5. Since I shall be obtaining on loan use of other people's Coloured illustrations I shall in return promise them the use of

Coloured illustrations I shall get made in their projected or future publications x

6. Photographs and black and white drawings shall be confined to subspecies and rare birds.
7. When two or three subspecies are found in Bihar, attempt should be made to give illustrations of all, preferably coloured ones, or a coloured male of the most common and monochrome males of the others x
8. When a geographical subspecies is found in Bihar, but in the contiguous states ~~other~~ other subspecies are found, shall illustrate in colour only the Bihar form x
The aim should be to enable a bird-watcher to identify atleast 400 species from this book, without having to refer to F.B.I.

LETTER PRESS

1. The Letterpress shall give Size (follow Fisher and Ali's system both) field characters, habitat, habits, Distribution, food, nesting etc.
2. Generally prominence shall be given only to main species, but where subspecies are the main Bihou form prominence should be given, but the binomial name shall be given.
3. In each case related forms and Indian geographical subspecies shall be mentioned.

Field Characters

1. Attempt- should be made to give new field characters so that- this book does not anywhere duplicate the earlier popular handbooks. Also it should enable a bird watcher to supplement one set of descriptions with- another and help him with- identification.
2. At least- 600 forms should have their field characters entered x
3. the aim should be help identification without- killing and securing a specimen x

Habitat-

1. Correlation with- land utilisation types and biotopes is essential x
2. A classification of land utilisation and biotopes would help in making entries in this section precise x The classifications should follow as tables at the end of the book as in Fisher's Bird Recognition - I.
3. The more detailed the classification of habitats is the better understanding of bird life would be x

Distribution

1. Superficially Bihar is divided into three major regions: (a) North Bihar plains with Siwalik hills, Champaran forests and Purnea grasslands. (b) South-Bihar foreland, plains and hills and forests, (c) Chotanagpur, Malanx, hills and forests.
2. A fourth division is the Eastern region comprising of Santal Parganas (Rajmahal Hills) & Purnea.
3. There are 17 districts, counting Saharsa as one that gives an average of 4,000 square miles to each district, but the districts vary from 2,000 to 7,000 sq. miles in area. An ideal system would be to divide the entire area in 35 units of 2,000 sq. miles each and number them 1 to 35 and then give the distribution. Most of the 2,000 sq. mile units can be given names and this would be a major part to the work of the book, because

most-statistical data used in Part II can only be meaningful if there is uniformity of area x

A tentative list of vice-districts is suggested here:

1. Belthiah
2. Motihari
3. Sitamarhi
4. Hajipur
5. Saran
6. Madhubani
7. Samastipur
8. Saharsa
9. Araria
10. Katihar
11. North-Monghyr
12. South-Monghyr
13. South Bhagalpur
14. Rajmahal
15. Deoghar
16. Dumka
17. Arrah
18. Sasaram
19. Raxigani
20. Nawadah
21. Garkwa
22. Mambad
23. Purulia
24. Ranchi
25. Lohardaga
26. Gumda
27. Khunti
28. Shalbhumi
29. Saranda
30. Palna
31. Bihar

In a more correct-division giving to each vice-district a rough area of 2,000 Sq. miles the areas can be marked off on the map.

4. In the Column noting distribution in Bihar

The vice-districts should be used.

5. In noting distribution in West-Bengal, Uttar Pradesh, Madhya Pradesh and Orissa mention by districts must be made of occurrence within the Ganges, Hooghly and 82° Long.
6. In rest-of India only states should be mentioned x
7. Outside India only names of countries should be mentioned x

Food

1. The names of insects harmful to agriculture and forestry must be mentioned
2. Soft-fruit, etc must be mentioned too.
3. All empl. should be made to classify bird food sources just like Habitats and Biotopes and Correlate the three and then try to interpret distribution through them x

NIDIFICATION

Under this head little fresh contribution can be made unless attempt is made to give a bird Calendar, noting the dates of the various stages for each species x

MIGRATION

Quite a large percentage of Biken's birds are migrants; details of a migration Calendar, extent of the migration of each species will be useful x A bird Calendar here too is an obvious need x

PART II

The Contemplated book should be one running into two volumes of 1200 pages each the first volume and a part of volume II should be given to identification x In part II I shall lead the bird-watcher to the understanding of Bihar's bird life x this part in fact shall be the most-valuable part of the book and should be such that the publication may be of interest to bird-lovers all over the world.

SPECIATION

The most important thing to determine in regard to Bihar's avifauna is whether its characteristic nature is merely the function of the state's location. Bihar is at the north-eastern end of the Peninsular area, it is at the eastern ^{end} of the Gangetic area and abuts on Bengal, Assam and the Himalayas & its bird life merely the complex of the extension in territorial range of species from those adjoining areas & this can be determined if we classify the species found in Bihar under the following heads:

- 1) Typical of Peninsular India, e.g. various backed shrike.
- 2) Typical of Orissa, e.g. Grackle
- 3) Typical of W. Bengal & Assam
- 4) Typical of Himalayas
- 5) Typical of Gangetic plains and North

West-India

(6) Typical of Bihar

(1) Typical of a larger area than 1-6 but together
it should be easy to assign any species
its place in this classification by studying the
distribution of the species outside Bihar & then
if the preponderating number of species is peninsular
then we shall have a quantitative basis for
saying Bihar's bird life is largely peninsular.

But within Bihar itself we can mark out
the vic = districts whose bird life is distinguish-
able by closeness to the five regional airfaunas
listed above.

The species and sub-species typical of
Bihar will naturally have a great importance
The study of their adaptation to their
particular environment will give the answer
to the important question: what special

problems are set to bird life by the environment
in Bihar x

LAND USE

Closely related to the environmental demand on bird-life is the estimation of land use and avifauna x the most correct method would have been to count birds and get figures for each habitat x the work is stupendous not only because of the difficulties of a bird count over such a large area, but because a land utilisation survey has ^{not} been carried out yet x

Shall, therefore, make a rough estimate of the percentage of forests and cultivated land to the total area of each vice-district x On that - superimpose the number of species reported from each vice-district x temporarily

This should give quite valuable information about the environment in Bihes and bird life adaptation x For some of the North Bihes vice - districts percentage of marsh or seasonally inundated land to the total area may be of considerable importance x Obviously this cannot be done for existing districts because the areas of the units should be approximately equal x

MIGRATION

The number of migrant species in each vice - district may also be noted, because the speciation and land use classifications will have to be compared to resident species x

Food

1. Insects - mention agr. & forest + horticultural pests + list - all insectivores esp. those feeding on pests.
2. Soft fruit - list - all the different fruits, look to the Home Library club book on birds for classification.
3. Berries
4. Plant shoots
5. Snails etc
6. Grains & pulses.

HABITATS

1. Fields under cultivation
2. Wastes
3. Forests (see Fisher)
4. Rivers & Lakes
5. Built-up areas
6. Under fields - not triple-cropped and double-cropped areas
Under forests - classify the different types
Under fields - note main crops.

Make this very detailed and Correlate this with bird food.

Classify habitats with regard to facilities for nesting - hedgerows, bushes, grass, sand, trees, shrubs, etc.

Correlate this with food and will arrive at a classification of habitats, about 20 varieties. Correlate that with land use.

and will get a full idea of habitats and bird-life x May even attempt a map to indicate habitat-character of the vic-districts x

CONCLUSION

I will arrive at the conclusion that the bird life of Bihar is a function of geographical location, land use and habitat (the last two being closely interlinked). Discuss the relative importance of the three factors.

In order to make the work have a basic scientific data which can be compared with other ecological studies, use rainfall and temperature statistics.

It will be better to conclude this Birds of Bihar work within a year. After that - I must take up life-studies of the Mhayaal and the Shama. The two may be combined in one book: Two Indian Songsters.

The outline of the work on Mhayaal is indicated here:

1. the Mhayaal - Anatomy and Classification - Subspecies + Variations if any
2. Distribution of the Mhayaal and allied forms all over the World + in India + Bihar in detail.
3. the typical Mhayaal Country - description of the environment - types of habitats, rainfall, temperature.
4. Food Habits - ref. to habitats
5. Nesting Habits - ref. to habitats
6. Territory, Song, Pairing, Courtship, Love, etc.

There are eight Coordinates which are independent of the human Calendar as was as the bird sexual cycle, but seem to be in a very remote way fundamental to both x three Coordinates are:

- ① The Winter Solstice, December 21 - fixed - shortest - day light -
- ② The Coldest - day of the year - variable in January
Take Average 5 yrs.
- ③ Vernal Equinox - March 21 - fixed, night - and day equal
- ④ Hottest - day of the year - variable in June - take Average 5 yrs.
- ⑤ Longest - day of the year June 21.
- ⑥ First - day of the rains - June 27 or say Average 5 yrs.
- ⑦ Last - day of Monsoon rain - Sept. or Oct.
Average 5 yrs.

⑧ Autumnal Equinox - Sept. 21.

In Case of the Whayal or the Shama no nesting is possible before the Coldest-day of the year has passed. No nesting is possible after the first-rains. In fact the last-brood should be in a condition to look after itself before the rains break. That gives a period of roughly 162 days, but this period should be preferably expressed in terms of the time taken between the laying of the first-egg of a clutch and the hatching of the last-chick of that clutch. If an average period for this process is found out after observing some 50 clutches, we can estimate the period available as three or four times the hatching time. If more than one brood is reared (even sometimes) this ratio is more important and gives an idea of sexual periodicity in the species. A very large

number of observations (1,000 pairs) in one particular locality should give very interesting data about nidification of the species, if averages are plotted against the eight-coordinates referred to above & the observations should relate to song variations in the male, gradual establishment of territory, selection of mate, courting, symbolic nest-building, premature copulations, real nest-building, completion of nest; effective copulation, laying of clutch, hatching, first flights of brood, release of brood from parental guidance and care, break-up of the mating relationship and any other significant stages.

The lengths of certain phases will have importance, e.g. courtship, nest-building, between effective copulation & laying of clutch, hatching period, post-hatching

mating x the lengths of these periods (averages of course) and the way these are distributed about the vernal equinox, the hottest day of the year and the longest day will throw much light on bird behaviour x it might also when observations are extended over a long period give us a figure as to how many days after the end of mating, mating begins again x this period is very important because the mating and the gap should be the two most important constituents of sexual periodicity x it is quite likely that these constituents may be the determining factors

When all these data have been obtained, we shall have correlated the bird breeding cycle with meteorological events and then will be the time to start investigations into the internal physiological changes in male and female birds and correlate these

With the breeding cycle, behaviour traits and meteorological traits x A number of examinations ~~on~~ of the gonads at different stages and dates and observations on plumage pigmentation changes and display apparatuses will enable to establish relationships between physiological changes within the bird, its appearance, the sexual cycle and the meteorological calendar x

I do not suppose such a complete study of any species has been made anywhere in the world and this should be a major contribution to science x I do not think this has been done even for the poultry hen which should have been so easy to study.

My theory is that among birds there is a "safe" period during which the bird

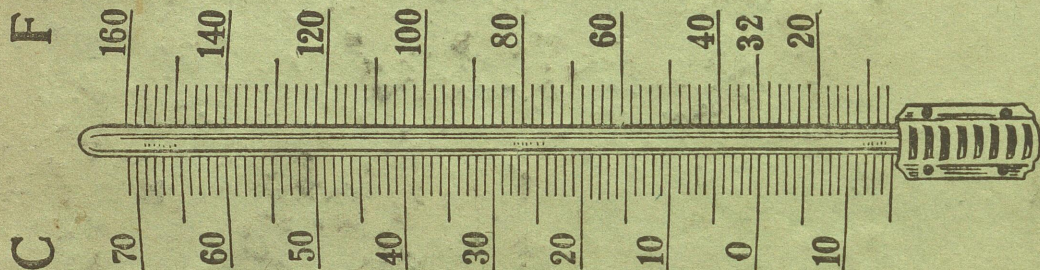
does not produce any ova x Roughly the "Safe" and "UnSafe" periods are 91 days and 273 days respectively in case of species which raise only one brood x Originally the distribution of these two periods must have been synchronous with the meteorological calendar but now is relatively free of it x Now the more important fact is that the "Safe" period must elapse after the hatching of the last brood before a fresh clutch is laid x

The flaw in this is that it bases the sexual cycle on the female bird, but the more spectacular role among birds is that of the male x the examination of the gonads of male and female birds should yield the clue as to how male changes almost-synchronously with those of the female x

METRIC CONVERSION

INCHES TO CENTIMETRES

INCHES	1	2	3	4	5	6	7	8	9	10	11	12
C M S	2.540	5.080	7.620	10.160	12.700	15.240	17.780	20.320	22.860	25.400	27.940	30.480



WEIGHTS & MEASURES TO METRIC

AVOIR DUPOIS	1 Ton	10 cwt	5 cwt	1 cwt	1 Stone	1 lb	1 oz
METRIC	1016.05 kg	508.024 kg	254.012 kg	50.802 kg	6.350 kg	0.454 kg	28.350 gm

BAZAR WEIGHTS	1 Maund	20 seers	5 seers	1 seer	1 Pau	1 chatak	1 Tola
METRIC	37.324 kg	18.662 kg	4.665 kg	0.933 kg	233.25 gm	58.313 gm	11.663 gm

LINEAR MEASURE	1 Mile	1 Flg	1 Yd	1 Ft	1 inch
METRIC	1609.34m	201.17m	0.9144m	0.3048m	0.0254m

2224

CONVERSION FACTORS

TO CONVERT	TO	MULTIPLY BY	TO CONVERT	TO	MULTIPLY BY
INCHES	CENTIMETRES	2.540	KILOGRAMS	POUNDS	2.20462
CENTIMETRES	INCHES	0.393701	SEERS	KILOGRAMS	0.93310
FEET	METRES	0.3048	KILOGRAMS	SEERS	1.07169
METRES	FEET	3.281	OUNCES	GRAMS	28.349
MILES	KILOMETRES	1.609	GRAMS	OUNCES	0.035274
KILOMETRES	MILES	0.62137	TOLAS	GRAMS	11.6638
POUNDS	KILOGRAMS	0.4535924	GRAMS	TOLAS	0.085735