In between these extremes one finds great variation, for example a medium expression presented by the tadpoles of mating 10×6.

A succinct anatomical analysis of whole limbs submitted to the transparency technique after staining with Victoria blue[4] showed conspicuous malformations of the cartilages, more pronounced in the forelimbs than in the hindlimbs. At all levels of the limbs the cartilages may be missing, short and wide, fused or duplicated, and bifurcated or distorted (figure 2).

This is the 2nd mutation affecting the limbs found in our stock of *Xenopus l. laevis*, the other one being 'polydactyly' *(pd)*[5]. The *pd* phenotype presents some similarity with *abl* but matings between frogs heterozygous for these 2 mutant genes gave only normal offspring, showing that these mutations are not allelic.

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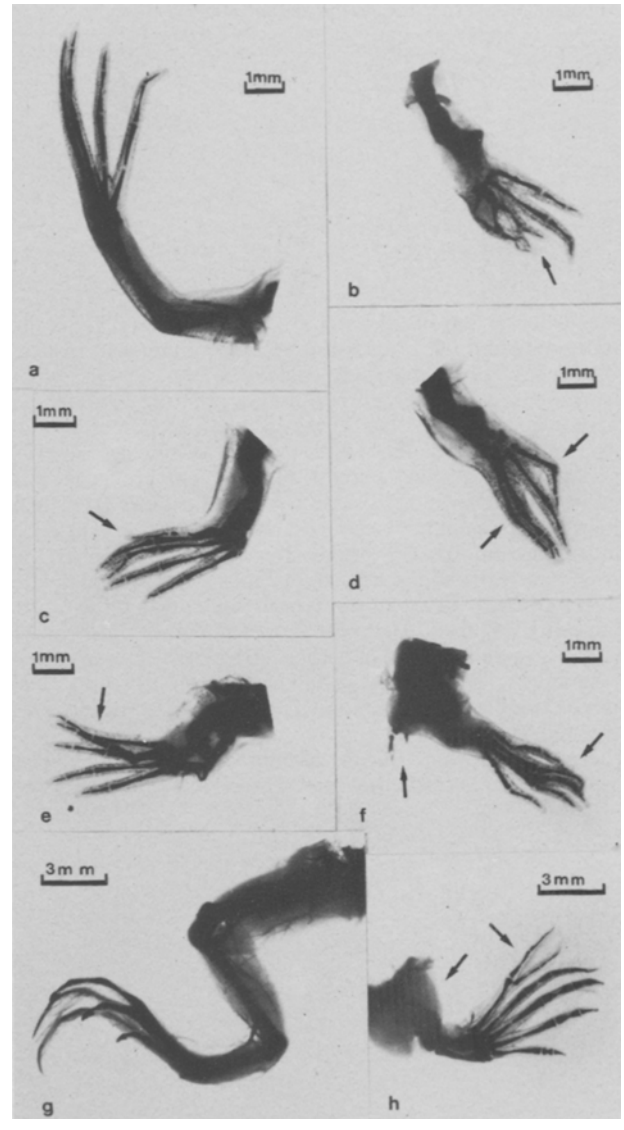

Fig. 2. Samples of limbs submitted to the transparency technique; *a* normal forelimb; *b–f* abnormal forelimbs, all showing brachymely. Arrows point to the main abnormalities observed: in *b*, brachydactyly; in *c*, polydactyly; in *d*, syndactyly and clinodactyly; in *e*, syndactyly and polydactyly; in *f*, syndactyly, polydactyly and abnormally situated supernumerary digits; *g* normal hindlimb; *h* abnormal hindlimb showing brachymely and polydactyly (arrows).

Distribution of constitutive heterochromatin (C-bands) in the somatic chromosomes of an Indian bird, *Chrysomma sinense* (Gmelin)

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Summary. The localization of constitutive heterochromatin has been studied in a passerine bird, *Chrysomma sinense* ($2n = \pm 70$). In all the 7 pairs of macrochromosomes pericentric heterochromatin has been observed as usual except in pairs Nos 2 and 4, in which both pericentric and non-centromeric heterochromatin have been recorded.

Though the function of constitutive heterochromatin is largely unknown[2], several possibilities have been proposed[3–7]. In birds, studies on the amount and distribution of constitutive heterochromatin are very scanty. Usually constitutive heterochromatin has been recorded in W-chromosomes[8] and the centromeric regions of Z and autosomes. In most cases, most of the microchromosomes have been reported to be entirely heterochromatic[9,10]. There are insufficient data concerning the interstitial and terminal localization of heterochromatin in birds[11]. Such non-centromeric heterochromatin, however, has been reported to play an important role in intrapopulational variation in mammals[3]. Miklos and Nankivell[5] suggested that the presence of interstitial heterochromatin may function in the regulation of recombination. In view of all these facts a study of the distribution of heterochromatin is considered important. In

Biometric data for macrochromosomes of *C. sinense*

Pair No.	1	2	3	4	5	6	7
Relative length	12.1	9.1	8.5	6.0	5.4	4.8	4.2
Centromeric index	30.0	26.0	–	–	–	–	–

the present paper the C-banded karyotype of an avian species *Chrysomma sinense* (Gmelin) (subfamily Timaliinae, family Muscicapidae, order Passeriformes) has been described, and compared with data from the literature.

3 male birds collected from Athagarh, Orissa, were used for the present investigation. The chromosome preparations were obtained from the bone marrow cells following the usual air drying technique of Ford and Hamerton[12], and stained with Giemsa. The morphometric analysis of chromosomes was made following Levan et al.[13]. C-bands were induced according to Sumner[14] with slight modifications.

About 64% of the good metaphase spreads observed showed the diploid chromosome number to be ± 70. The karyotype comprises 14 macro- and 56 microchromosomes. All the macrochromosomes could be arranged in 2 groups (figure 1). Group I comprises 2 pairs of sm-chromosomes and group II comprises 5 pairs of t-chromosomes. The relative lengths and centromeric indices of all the macrochromosomes are given in the table. The microchromosomes are either acrocentric or dot-shaped in nature, and show a gradual reduction in size.

Since only male birds could be procured for the present study the sex chromosomes could not be identified. Though the karyotype has typical passerine chromosomes it shows no remarkable resemblances to the karyotype of a confamilial species *Turdoides striatus striatus*[15].

The notable feature about the chromosomes of this species is the distribution of constitutive heterochromatin (figure 2). In the C-banded karyotype, all the macrochromosomes except pairs Nos. 2 and 4 have pericentric heterochromatin. The tip of the small arm of chromosome No.2 and the telocentric region of chromosome No.4 are heterochromatic besides their centromeres. No such terminal heterochromatin was observed in *Turdoides striatus striatus,* belonging to the same subfamily (Timaliinae), studied by Raman et al.[9].

As was mentioned earlier, probably terminal (non-centromeric) heterochromatin plays a role in variation within a population in birds too. Again, the present species, *Chrysomma sinense* might have a selective advantage due to the presence of such non-centromeric heterochromatin; this type of suggestion has been made by Mascarello and Mazrimas[4] for the genus *Ammospermophilis.* Further precision in this regard, however, will be possible only after we have learnt more about the amount and distribution of heterochromatin in chromosomes of bird species belonging to this subfamily in general and the genus *Chrysomma* in particular in the light of the C-banding technique.

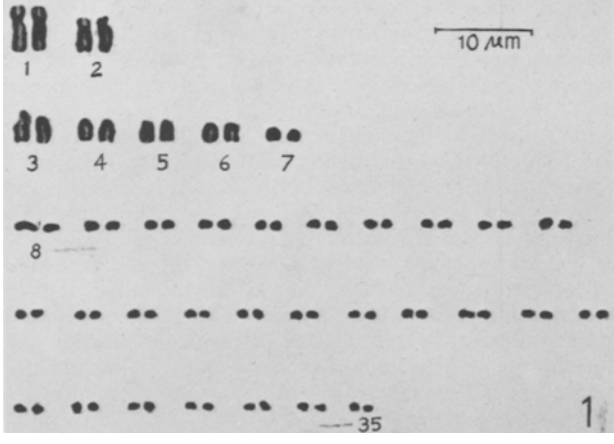

Fig. 1. Normal karyotype of *Chrysomma sinense.*

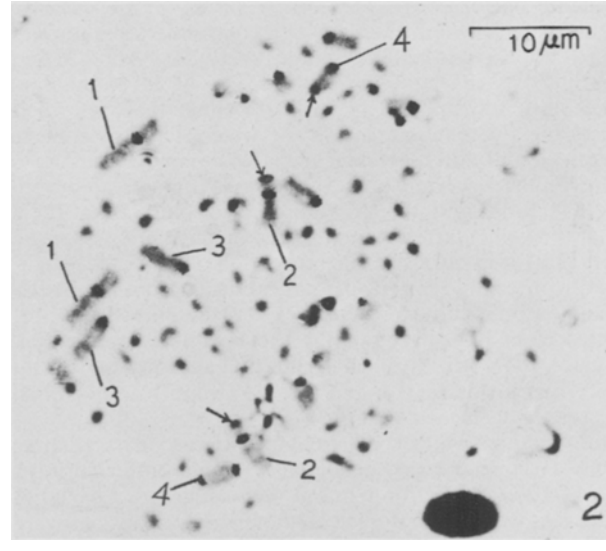

Fig. 2. C-banded metaphase spread of male *Chrysomma sinense.* Arrow heads indicate the localisation of non-centromeric heterochromatin.

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