The haemoproteids of the shrikes of the avian family Laniidae (Passeriformes)

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The two haemoproteids parasitizing members of the avian family Laniidae are reviewed. *Haemoproteus lanii* de Mello, 1937 is re-described and a neohapantotype designated; *H. lanii* var. *nucleophilus* Helmy Mohammed, 1958 is considered to be the same as *H. lanii* and therefore the varietal (= subspecific) designation is suppressed; it is confirmed that *H. lanuidae* Yakunin, 1976 is declared a *nomen nudum; Haemoproteus cublae* Peirce, 1984 is re-described.

Die twee Haemoproteidae wat die voëlfamilie Laniidae parasiteer word hersien. *Haemoproteus lanii* de Mello, 1937 word herbeskryf en 'n neohapanotipe word benoem; *H. lanii* var. *nucleophilus* Helmy Mohammed, 1958 as 'n subspecies word onderdruk aangesien dit nie van *H. lanii* onderskei kan word nie; daar word bevestig dat *H. lanuidae* Yakunin, 1976 'n *nomen nudum* is; *H. cublae* Peirce, 1984 word herbeskryf.

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The avian family Laniidae is essentially an Old World group which is predominant in the more tropical regions; several species have widespread distributions and one of these, *Lanius excubitor* L., also breeds in North America. The family has recently been the subject of considerable systematic revision. Clements (1978) considered the family to contain 71 species, and included the shrikes (Laniinae), the bush shrikes (Malaconotinae) and the bristled shrikes/bristleheads (Pityriasinae), but excluded the nine species of helmet shrikes which he placed in the family Prionopidae. On the other hand, Benson, Brooke, Dowsett & Irwin (1973) place the bush shrikes in a separate family, the Malaconotidae. Peters (1960) considered all the shrikes to be in various genera of the Laniidae while Edwards (1986) placed 83 species of shrikes in four subfamilies, viz., Malaconotinae (46 species), Laniinae (27 species), Pityriasinae (1 species), Prionopinae (9 species). This issue is far from resolved, but in the present study, all the shrikes will be considered as members of the four subfamilies of the Laniidae *sensu lato*. The importance of the final resolution of this issue to the present study lies in the fact that haemoproteids have been demonstrated to be host family specific (Bennett & Peirce 1988) and even subfamily specific (Atkinson 1986).

In 1937, de Mello described *Haemoproteus* from post-mortem material from a *Lanius schach* (Laniinae) shot in Goa, India. Helmy Mohammed (1958) described *H. lanii* var. *nucleophilus* from *Lanius excubitor* L. from Egypt and Yakunin (1976) named, without description or illustration, *H. lanuidae* from an unspecified laniid (*Lanius* sp.). Peirce (1984) described *Haemoproteus cublae* from *Dryoscopus cubla* (Shaw) (Malaconotinae). Haemoproteids have not been described from the other two subfamilies although unidentified haemoproteids were reported from two species of the helmet shrikes by Ashford, Palmer, Ash & Bray (1976) and Oosthuizen & Markus (1967). The present study re-describes *Haemoproteus lanii* and *H. cublae* and evaluates the status of these species.

Materials and Methods

Materials used in this study were deposited in the collection of the International Reference Centre for Avian Haematozoa (IRCAH) by the authors or by collaborators from around the world. Blood smears were air-dried, fixed in 100% methanol or ethanol and stained with Giemsa's stain at a pH of 7,2 if stained at the Centre. However, much of the material was stained prior to deposition in the Centre and some of these blood films were stained with 'quick' stains. Such blood smears usually faded rapidly and were valueless for taxonomic study unless de-stained and re-stained with Giemsa's; re-staining was never totally satisfactory.

The morphological parameters (Bennett & Campbell 1972; Forrester, Greiner, Bennett & Kigaye 1977) were obtained by drawing the appropriate cell with the aid of camera lucida and determining the lengths and areas with a Zeiss MOP-3 Digital Analyzer. Photographs were taken with a Zeiss Photoscope II. The number of specimens is denoted by *n* and the Nuclear Displacement Ratio by NDR in Table 1. The Nuclear Displacement Ratio (Bennett & Campbell 1972) represents the degree of lateral displacement of the erythrocyte nucleus towards the periphery of the cell through the action of

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Table 1 Morphometric parameters of *Haemoproteus lanii* and *H. cublae.* Means followed by standard deviation in parentheses; all measurements in micrometers; n = sample size

	H. lanii	*H. cublae*
Uninfected erythrocyte	n = 95	n = 15
length	11,9 (0,8)	12,2 (0,5)
width	6,5 (0,6)	6,5 (0,5)
area	62,4 (8,8)	61,9 (5,2)
Uninfected erythrocyte nucleus		
length	5,2 (0,6)	5,3 (0,4)
width	1,9 (0,2)	1,8 (0,2)
area	8,4 (0,8)	8,1 (0,8)
Macrogametocyte	n = 120	n = 15
Infected erythrocyte		
length	12,7 (0,8)	13,0 (0,6)
width	6,9 (0,6)	6,9 (0,6)
area	70,8 (7,5)	71,7 (7,8)
Infected erythrocyte nucleus		
length	5,0 (0,6)	6,0 (0,6)
width	2,1 (0,3)	1,9 (0,2)
area	8,8 (1,8)	10,3 (0,6)
Gametocyte		
length	15,4 (1,7)	12,7 (1,2)
width	3,5 (0,6)	2,9 (0,5)
area	54,0 (6,5)	36,4 (7,3)
Gametocyte nucleus		
length	3,4 (0,5)	2,6 (0,5)
width	2,1 (0,4)	1,8 (0,4)
area	5,9 (1,5)	3,6 (0,8)
Pigment granules	12,1 (2,3)	16,7 (1,3)
NDR	0,6 (0,2)	0,9 (0,1)
Microgametocyte	n = 40	n = 10
Infected erythrocyte		
length	12,6 (0,9)	13,6 (1,0)
width	7,3 (0,5)	6,9 (0,7)
area	74,4 (8,2)	75,8 (7,5)
Infected erythrocyte nucleus		
length	5,1 (0,7)	6,0 (0,5)
width	2,1 (0,3)	2,0 (0,2)
area	9,1 (2,0)	10,1 (1,8)
Gametocyte		
length	15,6 (1,6)	13,5 (0,7)
width	3,8 (0,5)	2,9 (0,4)
area	57,0 (6,7)	40,3 (5,5)
Gametocyte nucleus		
length	6,8 (1,0)	5,9 (0,5)
width	3,0 (0,5)	2,3 (0,4)
area	17,2 (3,4)	11,3 (1,4)
Pigment granules	13,8 (2,2)	17,3 (1,6)
NDR	0,5 (0,2)	0,8 (0,1)

the parasite. It is calculated using the formula NDR = $2x/x + y$, where x = the distance between the erythrocyte nucleus and the periphery of the erythrocyte and y = the distance between the erythrocyte nucleus and the periphery of the cell on the side of the parasite; y frequently, but not always, equals the width of the parasite.

Taxonomic review

Subfamily Laniinae

***Haemoproteus lanii* de Mello, 1937**

Synonym: Haemoproteus var. *nucleophilus* Helmy Mohammed, 1958.

Type host: Long-tailed shrike, *Lanius schach* L.

Type locality: Goa, India.

Immature gametocyte. Youngest form seen usually initiates growth as a small, round trophozoite lateral to the erythrocyte nucleus; margin entire.

Macrogametocyte (Figures 1, 2; Table 1). Parasite of medium size, occupying about 75% of the infected erythrocyte; parasite halteridial, usually causing little hypertrophy or distortion of the host erythrocyte; cytoplasm coarsely granular; pigment granules large, pronounced, rod-like to broadly ovoid in shape, yellow-brown, normally scattered randomly throughout the cytoplasm, averaging 12 per parasite; parasite nucleus small, dense, staining deep red with Giemsa's, median to sub-terminal in location; erythrocyte nucleus only slightly displaced laterally; volutin granules rarely encountered.

Microgametocyte (Figure 2; Table 1). General configuration as for the macrogametocyte with the usual sexual differences of large diffuse nucleus, fine homogenous cytoplasm as pale staining with all stains as summarized by Mathis & Leger (1911); tendency for pigment granules to concentrate at each pole.

Basis of description

Neohapantotype. Blood film no. 41809 from *Lanius schach* L., collected by H.E. McClure, Gujarat, India, 13 September, 1970.

Paraneohapantotypes. Blood film no. 41831 from *Lanius tigrinus* Drapiez, collected H.E. McClure, Maharashtra state, India, 30 July, 1968; blood film no. 11814 from *L. bucephalus* Temminck & Schlegel, collected H.E. McClure, Tunghai, Taiwan, 17 September, 1964; blood film no. 19223 from *L. collurio* L., collected W.J. Crans, Amani, Tanzania, 23 November, 1970; blood film no 97837 from *L. collaris* L., collected A. Harris, Pretoria, Republic of South Africa, 8 January, 1987; blood film nos. 103280, 104663 and 104668, from *L. collaris,* all collected by R.A. Earlé, Bloemfontein, Republic of South Africa, 1 September, 1988, 19 April, 1989 and 23 May, 1989, respectively.

Other hosts. Lanius colluroides Lesson; *L. cristatus* L.; *L. excubitor* L.; *L. senator* L.; *L. tephronotus* (Vigors); *L. validirostris* Ogilvie-Grant; *L. vittatus* Valenciennes.

Distribution. Europe, Africa, Asia and presumably throughout the distributional range of the Laniinae although no haemoproteid records are known from the two species of laniids that breed in North America. Shrikes are not known to occur in either the Australian or the Neotropical regions.

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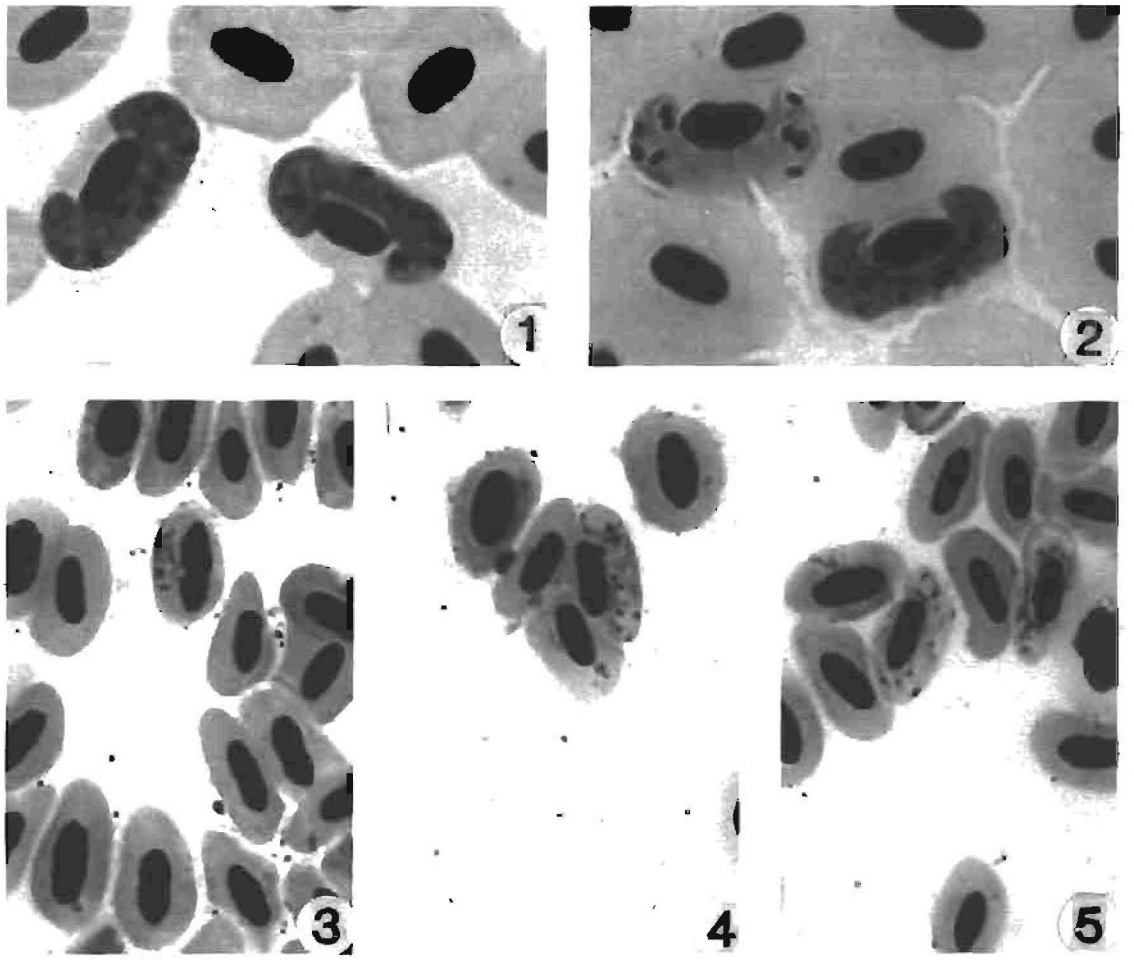

Figures 1–5 Figures 1 & 2 *Haemoproteus lanii*. Figure 1 Two macrogametocytes: note how the upper left parasite is closely appressed to the erythrocyte nucleus. Figure 2 Microgametocyte and macrogametocyte. Note the pale stain and homogenous appearance of the microgametocyte and the polar concentration of its pigment granules. Figures 3, 4, 5 *Haemoproteus cublae* Figure 3 Immature gametocyte: note ameboid outline. Figure 4 Macrogametocyte. Figure 5 Two microgametocytes, one mature (right) and one immature (note ameboid outline).

Comments. Haemoproteus lanii is a typical halteridial haemoproteid with entire margins that normally partially surrounds the erythrocytic nucleus. It is a medium-sized parasite that usually only slightly distorts the host cell. However, it can be broadly ovoid on occasion and occupy most of the erythocyte which displaces the host nucleus laterally to the margin of the cell rather than surrounding it. Thus, *H. lanii* must be considered a highly pleomorphic form. The high values for the standard deviation (Table 1) indicate this pleomorphism but some of the variability results from averaging data from several species of birds. Volutin granules are most uncommon. The parasite can be appressed closely to the erythrocyte nucleus or slightly drawn away (Figure 1) from it, both types occurring in the same field of view. Helmy Mohammed (1958) created *H. lanii* var. *nucleophilus* to accommodate the broadly halteridial forms that were appressed to the erythrocyte nucleus that he encountered in *Lanius excubitor*. He emphasized that the differences were not of a specific nature and hence referred to this haemoproteid by a varietal designation. His designation was made in 1958 and in the International Code of Zoological Nomenclature (ICZN 1985), Sect. 45 (g), such a designation can, at best, be considered as subspecific. However, as this form occurs commonly throughout the Laniinae in company with the more typical halteridial shape, it is considered herein to merely indicate the pleomorphic nature of this species and thus the term *nucleophilus* is suppressed.

The neohapantotype is a blood smear from the type host, *Lanius schach* from Gujarat, India, a location within 700 km of the type locality. The neohapantotype fills all the requirements of sect. 75 (d) of the ICZN.

***Haemoproteus lanuidae* Yakunin, 1976.** This parasite was declared a *nomen nudum* by Peirce & Bennett (1979).

Subfamily Malaconotinae

***Haemoproteus cublae* Peirce, 1984**

Type host: black-backed puffback, *Dryoscopus cubla* (Shaw).

Type locality: Balmoral, Zambia.

Immature gametocyte (Figure 3). Youngest form seen initiates growth lateral to the erythrocyte nucleus;

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margin can be slightly ameboid.

Macrogametocyte (Figure 4; Table 1). Parasite of small to moderate size, rarely filling more than 65% of the host erythrocyte, usually only about 50%; parasites halteridial with entire margins causing only slight hypertrophy of the host cell, usually in its length (about 7%); cytoplasm finely granular; pigment granules yellow-brown to black, small and appearing as dust, scattered randomly throughout the cytoplasm, averaging 16 per parasite; parasite nucleus small, dense, round to triangular in shape, staining deep pink with Giemsa's usually medial in the parasite and appressed to the outer margin; erythrocyte nucleus only slightly displaced laterally and slightly rotated from its longitudinal axis on occasion; volutin granules not seen in parasites of the hapantotype slide but noted in all parasites on the parahapantotype preparation (from *Laniarus barbarus*) where the numerous volutin granules were concentrated at each pole.

Microgametocyte (Figure 5; Table 1). General configuration as for the macrogametocyte with the usual sexual differences; nucleus stains pale pink and is highly dispersed, occupying about 33% of the area of gametocyte (compared to the 10% of the area occupied by the nucleus of the macrogametocyte).

Basis of description

Hapantotype. Blood film no. 91700 from *Dryoscopus cubla* (Shaw), collected by M.A. Peirce, Balmoral, Zambia, 7 March, 1981.

Parahapantotype. Blood film no. 46918 from *Laniarus barbarus* (L.), collected M.A. Peirce, Queen Elizabeth National Park, Uganda, 15 January, 1970.

Other hosts. Telephorus (= Malaconotus) sulfureopectus (Lesson) Uganda; *Tchagra minuta* (Hartlaub) Zaire.

Distribution. At present, known only from Zambia, Uganda and Zaire.

Comments. Haemoproteus cublae is similar to *H. lanii* in many respects. Re-examination of a long series of *lanii* infections shows that this latter species is pleomorphic and the various morphometric parameters overlap those of *cublae* (Table 1). Again, on re-examination of *cublae,* the number of pigment granules in this species is more than that originally described by Peirce (1984). The two species differ in that *cublae* is consistently smaller and that its immature gametocytes are ameboid.

As Peirce (1984) points out, *H. cublae* is recorded only from a single specimen and he further notes that six other species of the Malaconotinae are reported by Bennett, Whiteway & Woodworth-Lynas (1982) as hosts of haemoproteids. Re-examination of this material (as suggested by Peirce 1984) indicated haemoproteids consistent with the description of *cublae.* One of these, from *Laniarus barbarus,* has been designated a parahapantotype. The remainder, which have extremely light infections, are not suitable for designation as parahapantotype material, but are the basis of the additional host records above. Although this species is presently known only from Zambia, Uganda and Zaire, presumably, when a larger survey is completed, it will be found to occur throughout the range of the Malaconotinae.

The similarity of *H. cublae* to *lanii* could raise serious queries as to the validity of the former as a distinct species. However, as the experimental evidence (summarized by Bennett *et al.* 1982 and Bennett & Peirce 1988) has shown, haemoproteids are host family specific. Atkinson (1986) has shown that haemoproteids are specific at the subfamilial level as well and hence *H. cublae* can be readily justified as a valid species on the basis that it occurs in birds of a different subfamily from those in which *H. lanii* occurs. Furthermore, as Benson *et al.* (1973) maintain, the Malaconotinae have apparently been placed in the Laniidae in error and represent a distinct group of birds whose closest affinities are with the Sylviidae. If this proves to be the case, then this will further support the validity of *H. cublae* as a distinct species.

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