The Leucocytozoidae of South African birds. The Muscicapidae *sensu latu*

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Received 5 December 1991; accepted 10 September 1992

The leucocytozoids of the Muscicapidae *sensu latu* are reviewed and *Leucocytozoon phylloscopus* of the Sylviinae, *L. liothricis* of the Timaliinae, *L. dubreuili, L. mcclurei* and *L. shaartusicum* of the Turdinae are redescribed. *Leucocytozoon francai, L. giovannolia* and *L. mirandae* are declared synonyms of *L. dubreuili. Leucocytozoon timaliae* n. sp. is described from a South African babbler.

Die leucocytozoïede bloedparasiete van die Muscicapidae *sensu latu* word hersien en *Leucocytozoon phylloscopus* van die Sylviinae, *L. liothricis* van die Timaliinae, *L. dubreuili, L. macclurei* en *L. shaartisicum* van die Turdinae word herbeskryf. *L. francai, L. giovannolia* en *L. mirandae* word sinonieme van *L. dubreuili* verklaar. *Leucocytozoon timaliae* n. sp. word beskryf met 'n Suid-Afrikaanse katlagter as gasheer.

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Bennett, Bishop & Peirce (1991) discussed the composition of the passeriform family Muscicapidae, a large and diverse group whose systematics have been the centre of controversy among ornithologists for some time. Recently, a number of systematists have re-organized this group into a family (possibly a super family) and combined therein a number of avian groups previously considered to be of familial rank. These families have now been reduced to sub-familial status. Bennett *et al.* (1991) adopted a classification of the Muscicapidae that involved seven sub-familial units, including the Monarchinae, Muscicapinae, Pachycephalinae, Rhipidurinae, Sylvinae, Timaliinae and Turdinae in their review of the haemoproteids of the Muscicapidae *sensu latu*. This same classification is adopted here. The sub-Saharan members of the Muscicapidae include the Muscicapinae, Sylvinae, Timaliinae and Turdinae. All these families have an Old World distribution and with the exception of the Timaliinae, occur in the New World as well.

Bennett *et al.* (1991) concluded that, on the basis of available experimental evidence, haemoproteids are specific at both the familial and sub-familial levels. Recently, Bennett, Earlé, Peirce, Huchzermeyer & Squires-Parsons (1991), in a review of the leucocytozoids of the Phasianidae, again on analysis of the available experimental data, came to a similar conclusion concerning the Leucocytozoidae and that the species of this family were also specific at both familial and sub-familial levels. Five species of *Leucocytozoon* have been described from the Muscicapidae *sensu latu*. The best known of these species is *Leucocytozoon dubreuili* Mathis and Leger, 1911, a cosmopolitan species whose life cycle and sporogony was described by Khan & Fallis (1970). The distinctive *L. mcclurei* Greiner (1976) was described from thrushes from Thailand. Subkhonov (1980) described both *Leucocytozoon shaartusicum* from a central Russian thrush and *L. phylloscopus* from a warbler in Russia. *Leucocytozoon liothricis* (as *Haemomoeba liothricis*) was described by Laveran & Marullaz (1914) from seven *Liothrix lutea*, purchased from a dealer in Paris and apparently imported from Japan. These five species are redescribed. One new species, *Leucocytozoon timaliae*, from sub-Saharan babblers, is also described in this present study.

Materials and Methods

Materials used in these descriptions and in this study were deposited in the collection of the International Reference Centre for Avian Haematozoa (IRCAH) by collaborators around the world. The blood smears were air-dried, and fixed in 100% methanol or ethanol. Some material was stained on location, either with Giemsa's stain or with any one of the 'quick' stains before shipment to the Centre; other material was stained with Giemsa's stain after receipt. Much of the material stained with 'quick' stains faded badly and could not be re-stained effectively; such material was worthless from a taxonomic viewpoint.

The morphological characteristics (Bennett *et al.* 1991) were obtained by drawing the appropriate cell with the aid of a camera lucida and determining the lengths and areas with a Zeiss MOP-3 Digital Analyzer. As stated by Bennett *et al.* (1991), microgametocytes were subjected to the same morphological scrutiny as were the macrogametocytes and in most cases, the two sets of measurements proved to be virtually the same with the exception of the much larger parasite nucleus, typical of the apicomplexan parasites. In the interests of brevity, the measurements of the microgame-

tocytes are not presented but if a major variation from the macrogametocyte is noted, this variation is cited in text. Photomicrographs were taken with a Zeiss III Photomicroscope. All hapantotype, parahapantotype and other material used as the basis of these descriptions have been deposited in the collection of the International Reference Centre for Avian Haematozoa.

Taxonomic Review

HOST FAMILY MUSCICAPIDAE

Host subfamily Sylviinae

***Leucocytozoon phylloscopus* Subkhonov, 1980**

Type host: greenish warbler, *Phylloscopus trochiloides* (Sundevall).

Type locality: Valis river, Tadzhikistan SSR.

Macrogametocyte (Figures 1–3, Table 1). Parasite with only round morph. Parasite generally large and round to broadly ovoid; parasite nucleus generally round to ovoid, rarely elliptical, usually without marked karysome, occupying about 10% of the area of the parasite; vacuoles uncommon; nucleus of the host cell–parasite complex covering nearly half (48%) of the periphery of the parasite and occupying 24% of the area of the host cell–parasite complex, the nuclear material sometimes forming a pointed cap.

Microgametocyte (Figures 4, 5). Morphology of the parasites closely similar to that of the macrogametocytes. However, the microgametocytes average between 5–10% smaller in all dimensions. Nuclei of the microgametocytes stain extremely lightly with Giemsa's and frequently cannot be accurately defined.

Basis of description. Blood film no. 67635 from the goldcrest, *Regulus regulus*, collected by Kucera, 28 September 1977 Vosecka, Czechoslovakia; blood film no. 46751 from the great reed warbler, *Acrocephalus arundinaceus*, collected by Peirce, 15 December 1974, Ngulia, Kenya; blood film no. 46833 from the black-cap warbler, *Sylvia atricapilla*, collected by Peirce, 7 December 1975, Ngulia, Kenya; blood film no. 106598, from the chestnut-vented titbabbler, *Parisoma subcaeruleum*, collected by Earlé, 31 July 1989, Pellissier, South Africa.

Additional host records and distribution. As only *Leucocytozoon phylloscopus* has been described from the Sylviinae, all records of *Leucocytozoon* for the sylviids listed by Bennett, Whiteway & Woodworth-Lynas (1982) can be considered to be this species. The parasite is distributed throughout the Old World distribution of the subfamily Sylviinae and possibly in the New World species of this group.

Sporogony. Presumably in ornithophilic simuliids, as has been demonstrated for all other species of *Leucocytozoon* at this time (Fallis, Desser & Khan 1974).

Comments. Subkhonov (1980) described *Leucocytozoon phylloscopus* very briefly, presenting only length and width measurements and presenting two sketches. His measurements are considerably smaller (about two-thirds the size) than those presented here, but the two sketches indicate parasites that are the same. On the strength of the two drawings, we consider the leucocytozoid described here to be the same as *L. phylloscopus*. One unusual feature about this species is the relatively large size of the parasite nucleus, which occupies about 10% of the area of the parasite, compared to the more usual 5–6% in other leucocytozoids. No other species of *Leucocytozoon* has been described from the Sylviinae and it is assumed that all records to this genus in this subfamily of birds can be referred to this species.

Host subfamily Timaliinae

***Leucocytozoon liothricis* (Laveran and Marullaz, 1914)**

Type host: the red-billed Leiothrix, *Leiothrix lutea* (Scopoli).

Type locality: Paris, France.

Macrogametocyte (Figures 6, 7, Table 1). Parasites with round morph only. Parasites generally large, round to broadly ovoid; parasite nucleus round to broadly ovoid, rarely elliptical and usually without marked karysome, occupying about 5% of the area of the parasite; vacuoles uncommon; nucleus of the host cell–parasite complex covering 80% of the circumference of the parasite and occupying 24% of the area of the host cell–parasite complex, the nuclear material forming a thin band about the parasite.

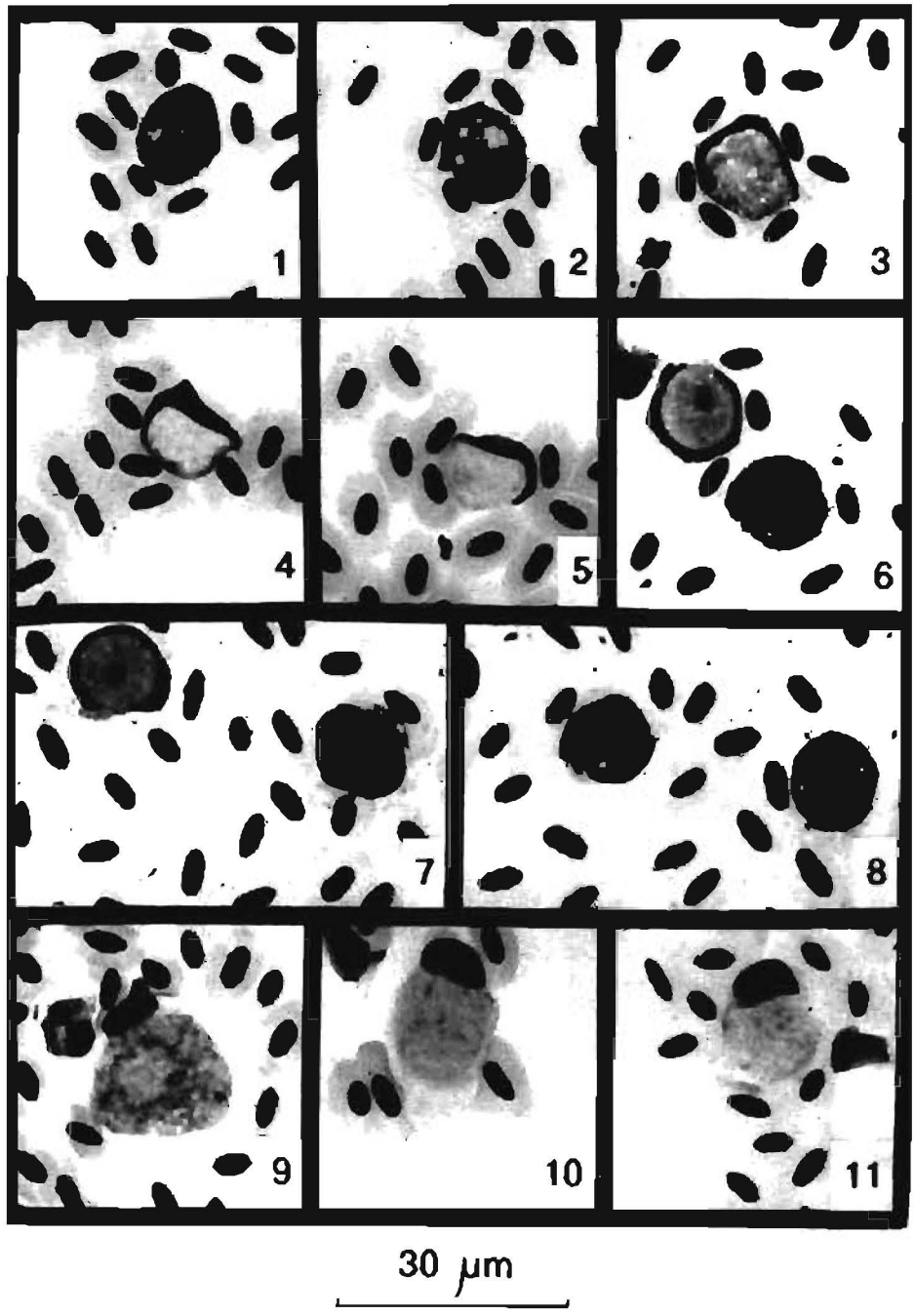
Microgametocyte (Figures 7, 8). Morphology of the parasite closely similar to that of the macrogametocyte, although the microgametocytes average slightly smaller (less than 5%) in most dimensions.

Basis of description. Neohapantotype. Blood film no. 41908 from the silver-eared mesia, *Leiothrix argentauris*, collected by McClure, 27 September 1966, Chiangmai, Thailand. **Paraneohapantotype.** Blood film no. 4317 from the chestnut-tailed Minla, *Minla strigula*, collected by McClure, 30 April 1961, Mt. Brinchang, Malaysia; blood film no. 11839 from the black-headed sibia, *Heterophasia melanoleuca*, collected by McClure, 3 November 1964, Chiangmai, Thailand; blood film. no. 41968 from the white-necked babbler, *Stachyris leucotis*, collected by McClure, May 27 1965, Mt. Brinchang, Malaysia.

Additional host records and distribution. All *Leucocytozoon* records from babblers (Bennett *et al.* 1982) can be referred to this species.The parasite occurs throughout the distributional range of the Timaliinae.

Sporogony. Presumably in ornithophilic simuliids.

Comments. Laveran & Marullaz described *Leucocytozoon liothricis* from three of seven birds bought from a dealer in Paris. They said that the birds were imported from Japan, but the distributional range of *Leiothrix lutea* does not extend to this country. It is more probable that the birds were imported from the then Indo-China (now Vietnam) as there was a brisk trade in exotic birds from that country at the turn of the century. This area is within the distributional range of the host. Laveran & Marullaz (1914) also described the parasite as a member of the genus *Haemamoeba*, stating that the parasites seen were merely stages in the life cycle of



Figures 1–5 ***Leucocytozoon phylloscopus***. Figures 1–3 — macrogametocytes; Figures 4, 5 — microgametocytes. **Figures 6–8** ***Leucocytozoon liothricis***. Figure 6 — two macrogametocytes; Figure 7 — macrogametocyte and microgametocyte; Figure 8 — two microgametocytes. **Figures 9–11** ***Leucocytozoon timaliae***. Figure 9 — macrogametocyte; Figure 10 — microgametocyte; Figure 11 — young (immature) microgametocyte.

this parasite, and in fact, they referred all blood parasites of mammals, birds and cold-blooded animals to this same group. The length and width measurements they present are slightly smaller than those presented in this study but the illustrations of both macro- and microgametocytes are the same parasite.

Laveran & Marullaz did not state where their material was deposited and it is presumed lost. A blood film from a bird of the same genus as the original host and from an area geographically close to the type host's distributional range has been designated as the neohapantotype.

***Leucocytozoon timallae* n. sp.**

Type host: the arrow-marked babbler, *Turdoides jardineii* (Smith).

Type locality: Lydenburg Fisheries, Transvaal, Republic of South Africa.

Macrogametocyte (Figure 9, Table 1). Parasite with only round morph. Parasite large, round to broadly ovoid; parasite nucleus round to ovoid, without marked karysome, occupying 5% of the area of the parasite; vacuoles uncommon; nucleus of host cell–parasite complex covering only 21% of the periphery of the parasite and occupying only 13% of the

Table 1 Morphometric parameters (in μm) of the macrogametocytes of the leucocytozoids of the Sylviinae and Timaliinae. n = sample size; means followed by standard deviations in parentheses

	L. phylloscopus $n = 63$	*L. liothricis* $n = 65$	*L. timaliae* $n = 15$
Parasite and nucleus			
maximum diameter/length	12,8 (1,4)	11,9 (1,1)	17,7 (2,5)
minimum diameter/width	10,3 (1,2)	10,4 (1,0)	14,0 (3,3)
periphery of parasite	38,3 (3,2)	35,9 (3,0)	53,0 (6,0)
area of parasite	104,6 (16,8)	96,8 (13,7)	209,3 (51,6)
maximum diameter/width nucleus	4,5 (0,8)	3,3 (0,7)	4,5 (0,5)
minimum diameter/width nucleus	3,1 (0,6)	2,5 (0,4)	3,6 (0,6)
area nucleus	10,7 (2,7)	6,2 (1,9)	11,8 (3,6)
Host cell–parasite complex			
maximum length/diameter	14,9 (1,2)	14,1 (1,0)	20,5 (2,0)
minimum length/diameter	12,2 (1,3)	12,2 (1,6)	20,5 (2,0)
area of complex	137,0 (18,7)	128,0 (17,7)	240,4 (54,7)
amount parasite periphery covered by complex nucleus	18,4 (3,7)	28,7 (3,6)	11,3 (1,4)
area of complex nucleus	32,4 (6,6)	30,7 (7,1)	31,1 (7,9)

area of the host cell–parasite complex, the nuclear material forming a small, bulbous cap.

Microgametocyte (Figures 10, 11). Parasite in form similar to the macrogametocyte but only half as large in area and about two-thirds of the other dimensions; host cell–parasite complex nucleus the same dimensions as in the macrogametocyte.

Basis of description. Hapantotype. Blood film no. 104929 from *Turdoides jardineii*, collected by de Swardt, 29 June 1989, at Lydenburg Fisheries, Transvaal, Republic of South Africa.

Additional host records and distribution. This parasite is known only from a single blood film from the type host in the type locality.

Comments. *Leucocytozoon timaliniae* is an extraordinarily large, round morph leucocytozoid and is larger than any of the leucocytozoids found in the family Muscicapidae. The small, bulbous cap of the host cell–parasite complex nucleus further serves to separate this species from all others in this family or any other round form of *Leucocytozoon*.

Host subfamily Turdinae

***Leucocytozoon dubreuili* Mathis and Leger, 1911**

Type host: 'grive' (= thrush)

Type locality: Thai Nguyen, Indo-China (= Vietnam)

Synonyms: ***Leucocytozoon francai* Nikitin, 1927**
***Leucocytozoon giovannolai* Travassos Santos Dias, 1954**
***Leucocytozoon mirandae* França, 1912**

Macrogametocyte (Figures 12–14, Table 2). Parasite with only round morph. Parasite of small size, generally broadly ovoid to round; parasite nucleus generally ovoid to round, more rarely elliptical, sometimes with marked karysome, fairly large, occupying 8–10% of the area of the parasite; vacuoles uncommon; nucleus of host–parasite complex as a band with both extremities drawn into bulbs, giving the parasite a 'double-capped' appearance and covering 70% of the periphery of the parasite and occupying 30% of the area of the host cell–parasite complex.

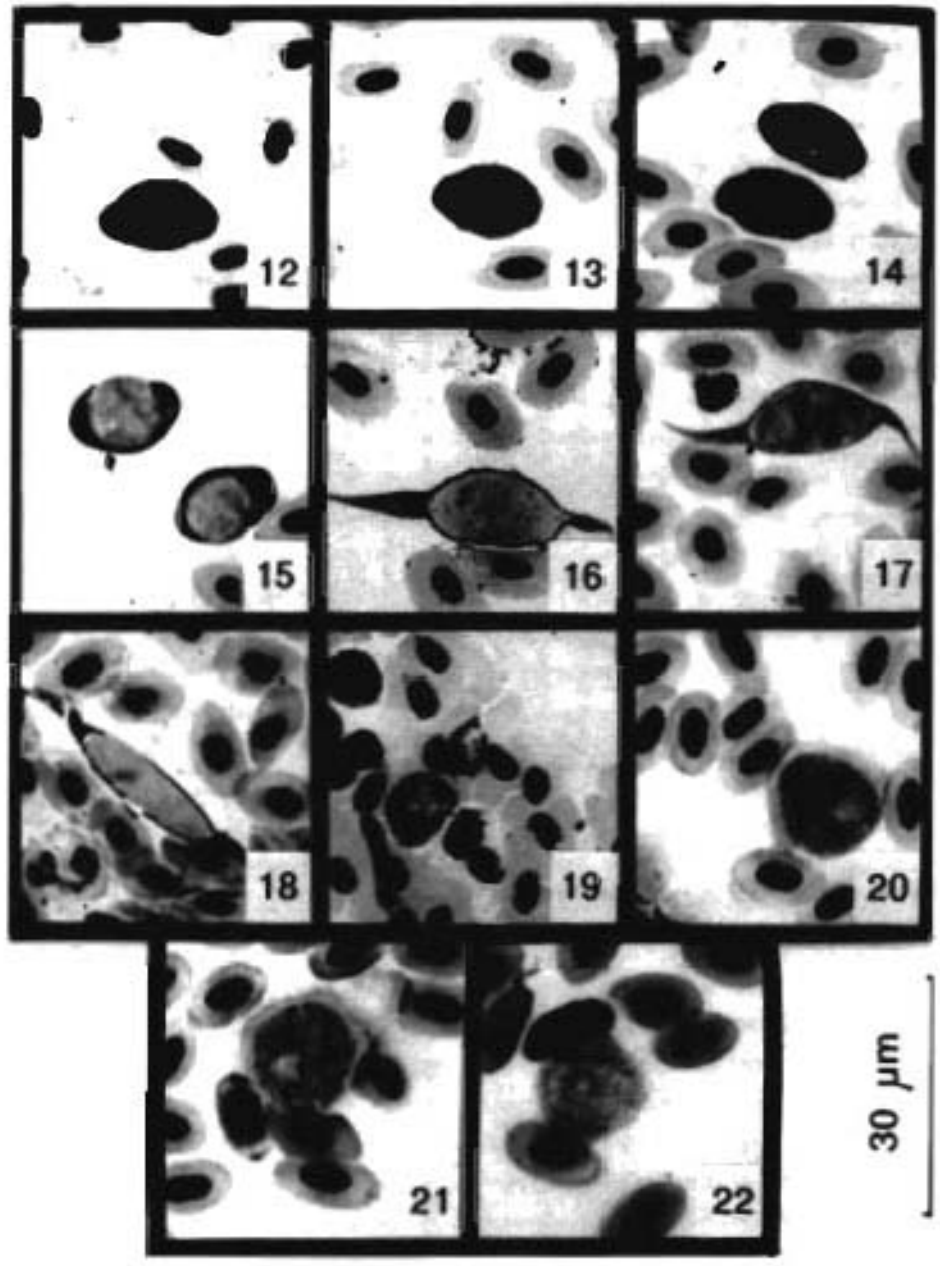
Microgametocyte (Figures 13, 15). Parasites morphologically similar to the macrogametocytes and slightly (less than 5%) smaller in most dimensions; per cent of parasite periphery covered by host cell–parasite complex nucleus is the same.

Basis of description. Neohapantotype. Blood film no. 42575 from the redwing, *Turdus iliacus*, collected by Threlfall, 23 January 1963, United Kingdom. **Paraneohapantotype.** Blood film nos. 89851 and 90584 from the American robin, *Turdus migratorius*, collected by Burry, 26 June 1982 and 28 May 1982, respectively at Gander, Newfoundland, Canada.

Additional host records and distribution. Leucocytozoid infections (unless specifically noted as *Leucocytozoon mcclurei* and *L. shaartusicum*) in thrushes listed by Bennett *et al.* (1982) can probably be ascribed to this species, which is found throughout the distributional range of the subfamily Turdininae.

Sporogony. Khan & Fallis (1970) reported at length on the life cycle of *Leucocytozoon dubreuili*. They showed that sporogony occurred in a variety of ornithophilic simuliids, including *Simulium quebecense*, *Prosimulium decemarticulatum* and *Cnephia ornithophilia* in Algonquin Park, Ontario, Canada.

Comments. Mathis & Leger (1911) described *Leucocytozoon dubreuili* from a 'thrush' killed near Thai Nguyen in what is now Vietnam. Nikitin (1927), Coatney (1937) and Hsu, Campbell & Levine (1971) all refer to the type host of *L. dubreuili* as *Turdus iliacus*. However, this thrush does not occur in Vietnam or south-eastern Asia and



Figures 12–15 ***Leucocytozoon dubreuili.*** Figure 12 — typical macrogametocyte with double caps; Figure 13 — macro- and microgametocyte; Figure 14 — macrogametocyte with only a single pronounced cap. **Figures 16–19** ***Leucocytozoon meclurei.*** Figures 16, 17 — macrogametocytes; Figure 18 — microgametocyte; Figure 19 — macrogametocyte, round morph. **Figures 20–22** ***Leucocytozoon shaartusicum.*** Figures 21, 21 — macrogametocyte; Figure 22 — microgametocyte.

they must have been dealing with some other thrush for which we do not have even a generic designation.

França (1912) described *Leucocytozoon mirandae* from the common blackbird *Merula merula* (= *Turdus merula*) in Portugal, a species which Fallis *et al.* (1974) considered to be a synonym of *L. dubreuili.* Nikitin (1927), not Nikitin & Artemenko (1927), described a leucocytozoid from the fieldfare *Turdus pilaris* as *Leucocytozoon francai.* Fallis *et al.* (1974) were unsure of the status of this species, but believed it might be a synonym of *L. dubreuili.* On reviewing the original description, however, in which no measurements or illustrations were presented, it appears that Nikitin was dealing with *L. dubreuili* and therefore, *L. francai* Nikitin is declared a synonym of *L. dubreuili.* Travassos Santos Dias (1954) in his studies on the haematozoans of the birds of Mozambique, described what he considered to be the three types of *Leucocytozoon.* These included those leucocytozoids with fusiform gametocytes only, those with both round and fusiform morphs and (his Type B) those which had only round gametocytes. In examples of his Type B species, he described 'Forms in which the nucleus of the host cell is disposed in two peripheral masses connected by a nuclear filament reminiscent of two TT by the free end of the vertical line. Type: *L. giovannolia* n. sp. in *Turdus iliacus.*' Travassos Santos Dias named this species in honour of Giovannola, who described but did not name a similar Type B leucocytozoid from *Turdus iliacus* in Italy. Quite clearly, *L. giovannolia* is *L. dubreuili* and must be considered to be a synonym. It is also possible that the confusion as to the type host of *L. dubreuili* stems from this fairly

Table 2 Morphometric parameters (in μm) of the leucocytozoids of the Turdinae. n = sample size; means followed by standard deviations in parentheses; F = fusiform morph; R = round morph

		L. mcclurei		
	L. dubreuili $n = 45$	R $n = 6$	F $n = 13$	*L. shaartusicum* $n = 50$
Parasite and its nucleus				
maximum diameter/length	10,6 (1,1)	10,6 (0,6)	19,6 (2,2)	13,7 (1,3)
minimum diameter/width	8,8 (1,3)	9,1 (0,8)	8,2 (1,8)	11,9 (1,0)
periphery of parasite	33,0 (6,2)	29,9 (1,9)	45,6 (4,3)	41,8 (2,9)
area of parasite	77,3 (14,2)	67,2 (9,2)	110,4 (17,9)	129,3 (16,1)
maximum diamter nucleus	3,5 (0,7)	2,8 (1,0)	2,9 (0,6)	4,2 (0,8)
minimum diameter nucleus	2,4 (0,4)	1,9 (0,3)	1,8 (0,4)	2,8 (0,6)
area nucleus	6,3 (1,7)	3,9 (1,3)	4,2 (1,6)	8,7 (2,5)
Host cell–parasite complex				
maximum length/diameter	15,3 (11,1)	11,1 (0,7)	40,0 (4,3)	16,3 (1,3)
minimum length/diameter	9,6 (1,4)	11,1 (0,7)	9,2 (1,9)	14,1 (1,4)
area of complex	108,8 (18,1)	87,3 (10,1)	161,6 (18,4)	175,4 (17,1)
amount parasite periphery covered by complex nucleus	22,9 (3,0)	15,2 (3,1)	45,6 (4,3)	31,8 (3,3)
area of complex nucleus	31,4 (5,3)	20,0 (3,6)	51,2 (8,7)	46,2 (11,1)

consistent association of *dubreuili*-like parasites in the literature with *Turdus iliacus*. As Mathis & Leger did not designate type material, it is assumed that their original material has been lost or destroyed. In view of the confusion surrounding the type host, and the fact that the name *Turdus iliacus* appears to be entrenched in the literature, a blood film from *Turdus iliacus* has been designated as the neohapantotype slide.

Leucocytozoon dubreuili is a pleomorphic parasite which can appear with only a single (Figure 14), rather than two, bulbous extremities, and on occasion, with no bulbs or 'caps'and just a simple band. It is consistent in having the nucleus of the host cell–parasite complex cover 70% of the periphery of the parasite, regardless of the appearance of the host cell–parasite complex nucleus.

Bennett & Cameron (1975) found leucocytozoids appearing identical to *Leucocytozoon dubreuili* in a number of bird species belonging to other avian families such as the Emberizidae and Bombycillidae. Khan & Fallis (1970) believed that they might have transmitted *L. dubreuili* via sporozoites to an emberizid sparrow and cautioned that this parasite might have a broader host range than normally associated with leucocytozoids. Additional experimental transmissions must be carried out to test this hypothesis.

***Leucocytozoon mcclurei* (Greiner, 1976) emend. Bennett, Earlé and Peirce**

Type host: the dark-sided thrush *Zoothera marginata* Blyth

Type locality: Chiangmai, Thailand

Macrogametocyte (Figures 16, 17, 19, Table 2). Parasite with both round and fusiform morphs. **Round morph (Figure 19).** Parasite small, generally round; parasite nucleus small, round to ovoid, without marked karysome, occupying about 6% of the area of the parasite; vacuoles not seen; nucleus of host cell–parasite complex covering 50% of the periphery of the parasite and occupying 23% of the area of the host cell–parasite complex', the nuclear material; forming a uniform band. **Fusiform morph (Figures 16, 17).** Parasite ovoid to elliptical, not round; parasite nucleus small, round to ovoid, not elliptical and without prominent karysome, occupying less than 4% of the parasite area; vacuoles not seen; nucleus of the host cell–parasite complex covering all (100%) of the periphery of the parasite and occupying 32% of the area of the host cell–parasite complex.

Microgametocyte (Figure 18). Morphology of both morphs closely similar to that of the macrogametocytes but the parasites range from 15–20% smaller than the macrogametocytes in most dimensions; host cell–parasite complex nucleus also covers 100% of the periphery of the parasite; nucleus of microgametocyte stains extremely poorly and usually cannot be seen sufficiently clearly to permit measurements.

Basis of description. Hapantotype. Blood film no. 41296 from *Zoothera marginata*, collected by McClure, 12 March 1970, Chiangmai, Thailand.

Additional host records and distribution. Known only from the type host and the type locality.

Comments. *Leucocytozoon mcclurei* is a highly distinctive leucocytozoid in a number of ways. It is the only member of the genus which has the nucleus of the host cell–parasite complex covering 100% of the fusiform parasite. It is the only leucocytozoid in the Passeriformes that has both fusiform and round morphs. Greiner (1976), in describing this species, called attention to the round gametocytes on the same slide but was hesitant to ascribe them as the round morph of this species; he thought that they represent an infection with a round leucocytozoid such as *Leucocytozoon fringillinarum*. However, the round morphs do not resemble *L. fringillinarum* and given the frequency of leucocytozoids with fusiform gametocytes that have round morphs pro-

duced by the hepatic cycle (Fallis *et al.* 1974), there is no reason to suspect that the round forms in this material do not represent the round morphs of *L. mcclurei*. This species is easily separated from the other leucocytozoa of the Muscicapidae by the uniqueness of its morphology. The name originally designated by Greiner (1976) was 'maccluri', an incorrect spelling of the name 'McClure' in whose honour the species was named. It is here emended, according to Section 34(d) of the International Code of Zoological Nomenclature, to 'mcclurei'.

***Leucocytozoon shaartusicum* Subkhonov, 1980**

Type host: stonechat, *Saxicola torquata* (L.)

Type locality: Tadzikhistan CCP

Macrogametocyte (Figures 20, 21, Table 2). Parasite with round morph only. Parasites large, round to broadly ovoid; parasite nucleus usually round or ovoid, sometimes elliptical and occasionally with marked karysome, occupying 6–7% of the area of the parasite; vacuoles not common; nucleus of the host cell–parasite complex covering 75% of the periphery of the parasite and occupying 26% of the host cell–parasite complex area; host cell–parasite complex as a thick band around the parasite, rarely extended into points or caps.

Microgametocyte (Figure 22). Parasites morphologically similar to the macrogametocyte but 10–15% smaller in most dimensions.

Basis of description. Neohapantotype. Blood film no. 104089 from the kurrichane thrush *Turdus libonyana*, collected by Neser, January, 1989, Rustenburg, Transvaal, Republic of South Africa. **Paraneohapantotype.** Blood film nos. 97629 and 104838 from the olive thrush *Turdus olivaceus*, collected by Cassidy, 18 October, 1986 and 14 January, 1989 respectively at the Botanical Gardens, Pretoria, Republic of South Africa.

Additional host records and distribution. This parasite was described from Tadjikistan and has not been reported since that time from south central Asia. It also occurs in sub-Saharan thrushes and presumably the distribution is throughout the Palaearctic-African region.

Comments. *Leucocytozoon shaartusicum* was briefly described and illustrated by Subkhonov (1980). He presented length and width measurements only, and these measurements are less than half the dimensions recorded here. However, the illustrations are of a parasite morphologically closely similar to those described herein, with a host cell–parasite complex nucleus that covers 75% or more of the periphery of the parasite. On this basis, the leucocytozoid found in sub-Saharan thrushes is considered to be *L. shaartusicum*.

The parasite is readily distinguished from the other leucocytozoids of the Turdinae by the presence of the host cell–parasite complex nucleus as a uniform band extending 75% about the periphery of the parasite, differing from *L. dubreuili* in lacking the 'double cap' appearance and from *L. mcclurei* in the absence of both a fusiform morph and the 100% coverage of the periphery of the parasite.

Subkhonov (1980) made no mention of deposition of type materials and it is presumed that they are lost or not designated. Therefore, neohapantotype and paraneohapantotype material are designated here. Unfortunately, no material from the Palearctic region was available and the designated material was derived from African specimens.

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