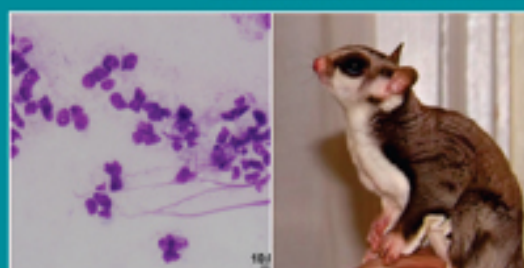
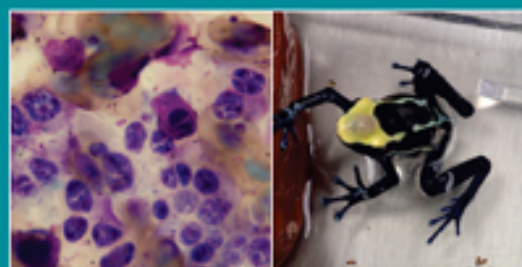
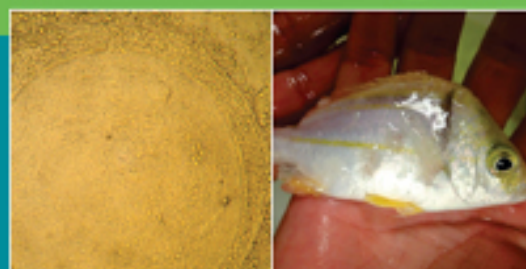
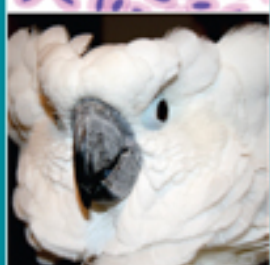
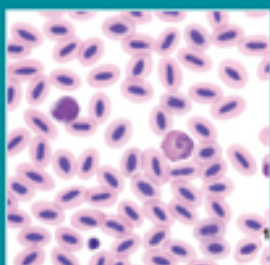
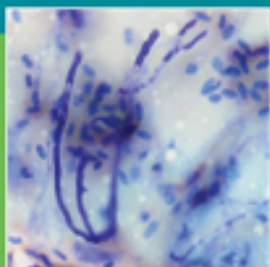


FOURTH
EDITION

Exotic Animal Hematology and Cytology



Terry W. Campbell

WILEY Blackwell

Exotic Animal Hematology and Cytology

■ **FOURTH EDITION**

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Giemsa stain; (b) heterophil in the blood film of a parrot (*Amazona oratrix*), Wright-Giemsa stain; (c) heterophils in the blood film of an owl (*Strix varia*), Wright-Giemsa stain; (d) heterophil in the blood film of a quail (*Colinus sp.*), Wright-Giemsa stain.

Figure 2.16 Immature heterophil (arrowhead) in the blood film of a parrot (*Amazona oratrix*), Wright-Giemsa stain.

Figure 2.17 (a) 1+ toxic heterophils in the blood film of a hawk (*Buteo regalis*), Wright-Giemsa stain; (b) 1+ toxic heterophil (arrow) and monocyte in the blood film of a hawk (*Buteo jamaicensis*), Wright-Giemsa stain; (c) 2+ toxic heterophil (arrow) and monocyte in the blood film of a hawk (*Buteo regalis*), Wright-Giemsa stain; (d) 2+ toxic heterophils in the blood film of an owl (*Bubo virginianus*), Wright-Giemsa stain; (e) 3+ toxic heterophils (arrows) in the blood film of a hawk (*Buteo regalis*), Wright-Giemsa stain; (f) 3+ toxic heterophil in the blood film of a parrot (*Eclectus roratus*), Wright-Giemsa stain.

Figure 2.18 (a) Eosinophil in the blood film of a domestic chicken (*Gallus gallus domesticus*), Wright-Giemsa stain; (b) eosinophil (arrow) and heterophils (arrowheads) in the blood film of a hawk (*Buteo jamaicensis*), Wright-Giemsa stain (1000×); (c) eosinophil (arrow) and heterophil (arrowhead) in the blood film of an owl (*Strix varia*), Wright-Giemsa stain; (d) eosinophil in the blood film of an eagle (*Aquila chrysaetos*), Wright-Giemsa stain; (e) eosinophil (arrow) and heterophil (arrowhead) in the blood film of an eagle (*Aquila chrysaetos*), Wright-Giemsa stain; (f) eosinophil (arrow) and a 1+ toxic heterophil (arrowhead) in the blood film of a hawk (*Buteo jamaicensis*), Wright-Giemsa stain.

Figure 2.19 An eosinophil with blue staining cytoplasmic granules in the blood film of a parrot (*Psittacus erithacus*), Wright-Giemsa stain.

Figure 2.20 (a) Basophil (arrow) and heterophil (arrowhead) in the blood film of a domestic chicken (*Gallus gallus domesticus*), Wright-Giemsa stain; (b) basophil in the blood film of a parrot (*Eclectus roratus*), Wright-Giemsa stain.

Figure 2.21 A thrombocyte (arrow) and lymphocyte (arrowhead) in the blood film of a domestic chicken (*Gallus gallus domesticus*), Wright-Giemsa stain.

Chapter 3

Figure 3.1 (a) Normal erythrocytes in the blood film of a lizard (*Iguana iguana*), Wright-Giemsa stain; (b) normal erythrocytes in the blood film of a turtle (*Terrapene carolina triunguis*), Wright-Giemsa stain; (c) normal erythrocytes in the blood film of a snake (*Boa constrictor*), Wright-Giemsa stain.

Figure 3.2 (a) Polychromatic erythrocytes (arrowheads) in the blood film of a lizard (*Iguana iguana*), Wright-Giemsa stain; (b) polychromatic erythrocyte (arrowhead) in the blood film of a turtle (*Chelonia mydas*), Wright-Giemsa stain; (c) polychromatic erythrocytes (arrowheads) in the blood film of a snake (*Boa constrictor*), Wright-Giemsa stain.

Figure 3.3 (a) Immature erythrocyte—a late polychromatic rubricyte (arrow) and polychromatic erythrocyte (arrowhead) in the blood film of a turtle (*Batagur borneoensis*), Wright-Giemsa stain; (b) immature erythrocytes—mid polychromatic rubricytes (arrows) and polychromatic erythrocyte

(arrowhead) in the blood film of a turtle (*Chinemys reevesii*), Wright-Giemsa stain.

Figure 3.4 (a) A mitotic figure in the blood film of a turtle (*Terrapene carolina triunguis*), Wright-Giemsa stain (1000×); (b) erythrocyte mitotic activity in the blood film of a turtle (*Chinemys reevesii*), Wright-Giemsa stain.

Figure 3.5 A reticulocyte with a ring of aggregated reticulum encircling the nucleus (arrow) in the blood film of a snake (*Boa constrictor*), new methylene blue stain.

Figure 3.6 The irregular basophilic inclusions in the cytoplasm of erythrocyte are considered to be artifact in the blood film of a turtle (*Chelonia mydas*), Wright-Giemsa stain.

Figure 3.7 Clear refractile spaces in the cytoplasm of erythrocytes (arrow) of lower vertebrates, such as reptiles and birds, are an artifact of slide preparation. Wright-Giemsa stain (1000×).

Figure 3.8 Binucleated erythrocyte in the blood film of a turtle (*Chinemys reevesii*), Wright-Giemsa stain.

Figure 3.9 Intracytoplasmic inclusions (arrows) within erythrocytes in the blood film of a snake (*Boa constrictor*) with IBD, Wright-Giemsa stain.

Figure 3.10 (a) Heterophils in the blood film of a lizard (*Iguana iguana*), Wright-Giemsa stain; (b) heterophils in the blood film of a turtle (*Terrapene carolina triunguis*), Wright-Giemsa stain; (c) heterophils in the blood film of a snake (*Boa constrictor*), Wright-Giemsa stain.

Figure 3.11 (a) Eosinophil in the blood film of a turtle (*Glyptemys insculpta*), Wright-Giemsa stain; (b) a

heterophil (arrowhead) and an eosinophil (arrow) in the blood film of a turtle (*Glyptemys insculpta*), Wright-Giemsa stain; (c) eosinophil (arrow) in the blood film of a snake (*Boa constrictor*), Wright-Giemsa stain; (d) an eosinophil with blue cytoplasmic granules in the blood film of a lizard (*Iguana iguana*), Wright-Giemsa stain; (e) an eosinophil with blue cytoplasmic granules in the blood film of a turtle (*Chinemys reevesii*), Wright-Giemsa stain.

Figure 3.12 (a) Basophil in the blood film of a lizard (*Iguana iguana*), Wright-Giemsa stain; (b) basophil in the blood film of a turtle (*Terrapene carolina triunguis*), Wright-Giemsa stain (1000×); (c) basophils (arrows) in the blood film of a snake (*Boa constrictor*), Wright-Giemsa stain.

Figure 3.13 (a) Lymphocytes in the blood film of a lizard (*Iguana iguana*), Wright-Giemsa stain; (b) a small and a large lymphocyte in the blood film of a turtle (*Glyptemys insculpta*), Wright-Giemsa stain; (c) a small and a large lymphocyte in the blood film of a snake (*Boa constrictor*), Wright-Giemsa stain; (d) lymphocytosis in the blood film of a lizard (*Pogona vitticeps*), Wright-Giemsa stain.

Figure 3.14 (a) A plasma cell (arrow) in the blood film of a lizard (*Pogona vitticeps*), Wright-Giemsa stain; (b) a plasma cell (arrow) in the blood film of a turtle (*Terrapene carolina triunguis*), Wright-Giemsa stain; (c) a plasma cell in the blood film of a snake (*Boa constrictor*), Wright-Giemsa stain.

Figure 3.15 (a) Monocyte in the blood film of a lizard (*Iguana iguana*), Wright-Giemsa stain; (b) monocyte in the blood film of a turtle (*Terrapene carolina triunguis*), Wright-Giemsa stain; (c) monocyte in the blood film of a turtle (*Cuora amboinensis*), Wright-

Giemsa stain; (d) monocytes in the blood film of a snake (*Boa constrictor*), Wright-Giemsa stain; (e) monocytosis in the blood film of a snake (*Morelia viridis*), Wright-Giemsa stain.

Figure 3.16 Monocyte with azurophilic granules (azurophil) in the blood film of a snake (*Boa constrictor*), Wright-Giemsa stain.

Figure 3.17 (a) Toxic heterophils (3+ toxicity) in the blood film of a lizard (*Iguana iguana*), Wright-Giemsa stain, 1000×; (b) toxic heterophils (2+ toxicity) in the blood film of a lizard (*Iguana iguana*), Wright-Giemsa stain; (c) toxic heterophil (2+ toxicity) in the blood film of a turtle (*Chinemys reevesii*), Wright-Giemsa stain; (d) 1 + toxic heterophils (arrowheads) in the blood film of a turtle (*Terrapene carolina triunguis*), Wright-Giemsa stain, 1000×; (e) toxic heterophil (3+ toxicity) with partial nuclear lobation in a species that does not lobe granulocyte nuclei in the blood film of a turtle (*Terrapene carolina triunguis*), Wright-Giemsa stain (1000×).

Figure 3.18 Progranulocyte in the blood film of a turtle (*Chinemys reevesii*), Wright-Giemsa stain.

Figure 3.19 (a) Numerous monocytes in the blood film of a lizard (*Pogona* sp.) with myelomonocytic leukemia, Wright-Giemsa stain; (b) numerous monocytes and a mitotic figure (arrow) in the blood film of a lizard (*Pogona* sp.) with myelomonocytic leukemia, Wright-Giemsa stain; (c) numerous monocytes and erythrophagocytosis (arrow) in the blood film of a lizard (*Pogona* sp.) with myelomonocytic leukemia, Wright-Giemsa stain; (d) numerous monocytes and monocyte with melanin pigment (arrow) in the blood film of a lizard (*Pogona*

spp.) with myelomonocytic leukemia, Wright-Giemsa stain.

Figure 3.20 Reactive lymphocyte in the blood film of a lizard (*Iguana iguana*), Wright-Giemsa stain (1000×).

Figure 3.21 (a) A monocyte showing erythrophagocytosis in the blood film of a lizard (*Iguana iguana*), Wright-Giemsa stain, 1000×; (b) a monocyte showing erythrophagocytosis in the blood film of a lizard (*Iguana iguana*), Wright-Giemsa stain (1000×).

Figure 3.22 A melanomacrophage in the blood film of a lizard (*Iguana iguana*), Wright-Giemsa stain (1000×).

Figure 3.23 (a) Thrombocytes in the blood film of a lizard (*Iguana iguana*), Wright-Giemsa stain; (b) thrombocytes in the blood film of a turtle (*Chelonia mydas*), Wright-Giemsa stain; (c) clumped thrombocytes in the blood film of a turtle (*Terrapene carolina triunguis*), Wright-Giemsa stain; (d) thrombocyte in the blood film of a snake (*Boa constrictor*), Wright-Giemsa stain; (e) thrombocytes (arrowheads) and small lymphocyte (arrow) in the blood film of a turtle (*Chinemys reevesii*), Wright-Giemsa stain; (f) thrombocytes (arrowheads) and large lymphocyte (arrow) in the blood film of a turtle (*Chelonia mydas*), Wright-Giemsa stain; (g) thrombocyte (arrowhead), small lymphocyte (small arrow), and immature erythrocyte—midpolychromatic rubricyte (large arrow) in the blood film of a turtle (*Chinemys reevesii*), Wright-Giemsa stain.

Chapter 4

Figure 4.1 Normal erythrocytes in the blood film of a salamander (*Ambystoma tigrinum*), Wright-Giemsa stain.

Figure 4.2 A polychromatic erythrocyte that lacks the dense chromatin clumping of mature erythrocytes in the blood film of a salamander (*Ambystoma tigrinum*), Wright-Giemsa stain.

Figure 4.3 Neutrophils in the blood film of a salamander (*Ambystoma tigrinum*), Wright-Giemsa stain.

Figure 4.4 An eosinophil in the blood film of a salamander (*Ambystoma tigrinum*), Wright-Giemsa stain.

Figure 4.5 A basophil (arrow) in the blood film of a salamander (*Ambystoma tigrinum*), Wright-Giemsa stain.

Figure 4.6 A lymphocyte in the blood film of a salamander (*Ambystoma tigrinum*), Wright-Giemsa stain.

Figure 4.7 A monocyte with immature eosinophils (arrowheads) in the blood film of a salamander (*Ambystoma tigrinum*) with eosinophilic leukemia, Wright-Giemsa stain.

Figure 4.8 A reactive thrombocyte with eosinophilic cytoplasmic granulation in the blood film of a salamander (*Ambystoma tigrinum*), Wright-Giemsa stain.

Figure 4.9 A reactive thrombocyte (arrow) compared with erythrocytes, eosinophils, and a neutrophil (arrowhead) in the blood film of a salamander (*Ambystoma tigrinum*), Wright-Giemsa stain.

Chapter 5