

THE BLOOD PICTURE OF NORMAL LABORATORY ANIMALS*

ROBERT A. SCARBOROUGH

BIRDS

I. *Method of obtaining blood.* Blood may be obtained from the wing vein. Care must be taken in securing blood, because of the quick degenerative changes which the thrombocytes undergo. Degenerated thrombocytes resemble degenerated leukocytes. Smears must be made quickly and in a dry place.

II. *Description of the red blood cells.* These cells are elliptical, biconvex, and nucleated. In size they vary greatly in different species and even in the same species. As a general rule, the bigger the bird, the larger the corpuscles. Occasionally round erythrocytes are seen. Magnan³⁸⁹ gives a table of the size of the red blood cells in 46 different species of birds. He finds the average length to be from 13 to 15 μ , varying from 5 μ to 10 μ . Venzlaff⁵⁷⁶ also gives a table of the size of the red blood cells in 50 different species. He finds an average length of from 13 to 15 μ , varying between 10 μ and 20 μ , with an average width of 7.5 μ , varying from 6 μ to 9 μ .

III. *Enumeration of the red blood cells.* Venzlaff⁵⁷⁶ found, in 50 species examined, that the majority of normal values lie between 2,200,000 and 3,500,000 per cu. mm., with an extreme range of 1,700,000 to 5,400,000.

In the pigeon the average number is 3,800,000 (Schauman and Rosenqvist⁴⁹², Fritsch¹⁸¹, Hedfeld²¹⁸, and Marloff³⁶⁰).

IV. *Description of the white blood corpuscles.*

Polymorphonuclear cells. There are no neutrophilic leukocytes in birds. Instead there is a type of cell already described as occurring in the chicken, with peculiar, little spindle-shaped bodies of eosinophilic substance in the protoplasm. These vary considerably in size in different species of birds. They are truly acidophilic, taking neither neutral nor basic stains. The nucleus is usually bilobed, the two lobes joined by a narrow connecting band. Bizzozero⁴⁶ described the nucleus as "spectacle-shaped". Mononuclear forms, however, are also found.

Lymphocytes. These cells more closely resemble the human blood cells than any other type. The nucleus almost entirely fills

* Continued from p. 206, Vol. 4, No. 2.

the cell, and is surrounded by a very small zone of non-granular protoplasm. Both nucleus and cell protoplasm are strongly basophilic, the protoplasm being even more so than the nucleus. These cells are from 5.2 to 5.7 μ in diameter.

The large mononuclear cells are smaller than the corresponding cells in human blood (6.7-9.3 μ). The nucleus is round, oval, or somewhat invaginated.

Polymorphonuclear eosinophils. These cells are not so large as the human eosinophils (6.5-7.8 μ). The nucleus is similar to that of the other polymorphonuclear cells. The granules are rounded, fairly large, and not as intensely acidophilic as those in the polymorphonuclear cells described above.

Polymorphonuclear basophils. These are from 4 to 12 μ in diameter. The nucleus is usually round or slightly polymorphous, more rarely there may be several distinct lobes. It is large and concentrically located. There is relatively little protoplasm, which is usually colorless. The granules may vary much in number and in size. They are strongly basophilic, staining metachromatically.

V. *Enumeration of the white blood corpuscles.* The normal total leukocytic count in birds ranges from 35,000 to 60,000 per cu. mm. The lymphocytes show an exceedingly variable quantity in the differential count in birds of different species, ranging from 14.4 per cent in the cockatoo to 92 per cent in the stormy petrel. The usual finding is from 40 to 50 per cent.

The number of polymorphonuclear cells is inversely proportional to the number of lymphocytes. The relative number of the large mononuclears is more constant than is that of the lymphocytes, as a rule being from one to nine per cent, never exceeding 13.2 per cent. The relative number of basophils is quite variable, ranging from 0 to 23.8 per cent. They are most numerous in the blackbird (Cullen¹¹²).

Fritsch¹⁸¹ and Hedfeld²¹⁸ record the following average percentages for the different types of cell in pigeons:

	(Fritsch)	(Hedfeld)
Polymorphonuclears	35.5	22.7
Lymphocytes	58	49
Large mononuclears and transitionals	3	13
Eosinophils	1.5	10
Basophils	2	3.3

VI. *Platelets.* Fritsch¹⁸¹ reports that platelets are "very few" in birds.

THE FROG

I. *Method of obtaining blood.* The various investigators reporting on this subject fail to describe their technic. The animals may be killed and the blood taken easily from any source desired.

II. *Description of the red blood cells.* The erythrocytes have, to some extent, the same characteristics as those of the fowl. The typical cell is flattened, oval and biconvex, with a thickened equatorial area. There is an oval nucleus. Certain atypical forms are frequent, some larger, more stoutly oval than the typical cells, with a megaloblastic type of nucleus (large, spheroidal). Others are small, with a small nucleus and very little hemoglobin. Non-nucleated forms occur with rather greater frequency than in the fowl.

Size. The average size of the red cells is 22 by 16 μ . (Goodall¹⁹⁴, Heinz²²², Welcker⁶⁰²). Heinz finds the average size of the nucleus to be 9.5 μ by 5.4 μ .

III. *Enumeration of the red blood cells.* The average erythrocytic content found in 91 counts by seven investigators is 460,000 per cu. mm., with a normal range of about 400,000 to 600,000. The following table gives the values found in the literature.

ERYTHROCYTES						
Authority		Average	Maximum	Minimum	No. of Counts	No. of Animals
Alder & Huber	(6)	.41	—	—		normal
Goodall	(194)	.50	—	—		normal
Hünerfauth	(243)	.45	.54	.40	33	33
Klieneberger & Carl	(281)	.38	—	—	8	8
Marloff	(350)	.50	—	—	10	10
Welcker	(602)	.40	—	—		normal
Wells & Sutton	(605)	.59	—	—		normal
Average		.46				
(91 counts by 7 authors)						

IV. *Physiological variations of the red blood cells.* No information is available.

V. *Hemoglobin content.* Insufficient work has been done to establish reliable normal values, but the following are recorded.

HEMOGLOBIN			
Authority		Average	Technic
Alder & Huber	(6)	80	% of human standard
Klieneberger & Carl	(281)	52	Sahli
Kuhl	(295)	14.6	g. per 100 cc. blood Hüfner's spectrophotometer.

VI. *Physiological variations in hemoglobin.* No investigations on this subject were found.

VII. *Description of the white blood corpuscles.*

Polymorphonuclear neutrophils. These cells generally have a polymorphous nucleus, but mono- or bilobed forms also occur. The protoplasm is made up of a homogeneous basophilic substratum, throughout which are scattered fine metachromatic neutrophilic granules. These granules are always very small, but vary in size from a scarcely perceptible dust to very definite spheroidal granules of bright lilac color, strikingly resembling those of human blood.

The most conspicuous thing in these cells is the "attraction sphere" (Jordan²⁶⁹), generally located within the concavity of the lobulated nucleus. The neutrophilic granules are arranged in lines radiating from the sphere. It may consist of a spherical mass of minute granules imbedded in a dense protoplasm, or it may occur as a clear area containing a clear-staining granule or centrosome. The latter may be simple, bilobed, or double (Jordan²⁶⁹).

Lymphocytes vary greatly in size, but retain similar nuclear and protoplasmic characteristics. The smallest are slightly larger than the nucleus of a platelet (Jordan), with a scarcely perceptible shell of basophilic protoplasm. The nucleus is spherical and pyknotic. The resemblance of these cells to the human lymphocytes is striking.

Large mononuclear and transitional cells are rare, and they do not warrant division into a separate class from the lymphocytes (Jordan).

Polymorphonuclear eosinophils. These have a polymorphous nucleus and occasionally are shaped like a horseshoe. Rarely is the nucleus multiple. It is generally located at one end of a spheroidal cell. The protoplasm contains rather small, spheroidal, intensely eosinophilic granules which are approximately uniform in size. They appear hollow or annular, due probably to a difference in density between the center and periphery of the granules. There is a weakly basophilic substratum of homogeneous protoplasm.

Polymorphonuclear basophils. These cells are somewhat smaller than the eosinophils. They are about the size of a medium-sized lymphocyte, and are spherical. The nucleus is centrally located and is vesicular, usually oval or rounded, or less frequently polymorphous, containing a very delicate reticulum. The protoplasm is densely packed with spherical, metachromatically basophilic granules, larger than the eosinophilic granules, but varying somewhat in size and shape.

VIII. *Enumeration of the white blood cells.* Four investigators have found an average total leukocytic count of 18,310 per cu. mm. (63 counts). Goodall¹⁹⁴ is the only authority who gives normal differential values. He found the following:

Polymorphonuclears	7%
Lymphocytes	59%
Eosinophils	27%
Basophils	7%

The accompanying table gives the values found in the literature.

		LEUKOCYTES									
<i>Authority</i>		<i>Average</i>	<i>Maximum</i>	<i>Minimum</i>	<i>No. of Counts</i>	<i>No. of Animals</i>	<i>Po.</i>	<i>Ly.</i>	<i>L.M.&T.</i>	<i>Pme.</i>	<i>Pmb.</i>
Alder & Huber..	(6)	25.0	—	—	normal	—	—	—	—	—	—
Goodall	(194)	11.0	—	—	normal	7	59	—	27	7	—
Hünerfauth	(243)	20.9	37.8	13.6	33	33	—	—	—	—	—
Wells & Sutton..	(605)	10.4	—	—	normal	—	—	—	—	—	—
Average		18.31									
(63 counts by 4 authors)											

IX. *Physiological variations of the white blood cells.* The eosinophils are relatively fewer in winter than are the basophils, but in the fall they are more numerous (Goodall¹⁹⁴).

X. *Platelets.* Jordan²⁸⁹ describes these as stout fusiform elements with a central, deeply-staining oval nucleus. The cytoplasm stains only very faintly and contains metachromatic, spherical granules of uniform size. The cytoplasm is extremely viscid and is drawn out at numerous points into pseudopod-like projections. These contain the majority of the granules.

XI. *Coagulation time.* No reports have been made.

XII. *Resistance of the red blood cells.* No investigations on this subject could be found.

XIII. *Blood volume.* Fry¹⁸² found the average blood volume in 31 animals to be 4.61 per cent of the body weight, varying from 3.45 to 6.2 per cent.

XIV. *Specific gravity.* No studies are available.

BIBLIOGRAPHY

- 1 Abderhalden, E.: *Ztschr. f. physiol. Chem.*, 1898, 25, 65-115.
- 2 —————: *Ztschr. f. Biol.*, 1902, 43, 125-94.
- 3 —————: *Ztschr. f. Biol.*, 1902, 43, 443-89.
- 4 Afanassiew, M.: *Arb. a. d. med.-klin. Inst. d. k. Ludwig-Maximilians-Univ. zu München*, 1884; *Also*, *Deutsches Arch. f. klin. Med.*, 1884, 35, 217-53.
- 5 Albertoni and Mazzoni, G.: *Arch. f. d. ges. Physiol.*, 1891, 50, 587-99.
- 6 Alder, A. and Huber, E.: *Folia haematol.*, 1923, 29, Arch. 1-22.
- 7 Amendt, K.: *Arch. f. d. ges. Physiol.*, 1922, 197, 556-67.
- 8 Anderson, J. F., and Neill, M. H.: *J. Med. Research*, 1915, 33, 141-45.
- 9 Arnold, J.: *Virchow's Arch. f. path. Anat.*, 1895, 140, 411-48.
- 10 —————: *Centralbl. f. allg. Path. u. path. Anat.*, 1896, 7, 705-08.
- 11 —————: *Virchow's Arch. f. path. Anat.*, 1897, 148, 470-500.
- 12 Arthus: [Quoted by Ellenberger and Scheunert.]
- 13 Aschoff, L.: *Pathologische Anatomie*. Jena, 1913.
- 14 Asher, L., and Dubois, M.: *Biochem. Ztschr.*, 1917, 87, 141-87.
- 15 —————, and Vogel, H.: *Biochem. Ztschr.*, 1912, 43, 386-409.
- 16 Athanasiu, J.: *Dict. de physiol. de Richet*, 1898, 3, 328-43.
- 17 —————, and Carvallo, J.: *Dict. de physiol. de Richet*, 1898, 3, 476-551.
- 18 Auché, B., and Vaillant, L.: *J. de méd. de Bordeaux*, 1901, 31, 591-92.
- 19 Averous: *Rev. vét.*, Toulouse, 1896, 437.
- 20 Backman, E. L., Edström, G., Grahs, E., Hultgren, G., and Price, H.: *Compt. rend. Soc. de biol.*, 1924, 91, 1089-92.
- 21 Barlow, O. W., and Ellis, M. M.: *Am. J. Physiol.*, 1924, 70, 58-67.
- 22 Baum, H.: *Ellenberger's Handb. d. vergleich. mikroskop. Anat. d. Haustiere*, 1911, 2, 127.
- 23 Bedson, S. P.: *J. Path. & Bact.*, 1923, 26, 145-55.
- 24 —————, and Zilva, S. S.: *Brit. J. Exper. Path.*, 1923, 4, 5-12.
- 25 —————: *Brit. J. Exper. Path.*, 1923, 4, 305-10.
- 26 Benacchio, G. B.: *Folia haematol.*, 1911, 11, Arch., 253-70.
- 27 Bender, L.: *J. Med. Research*, 1924, 44, 383-99.
- 28 —————, and DeWitt, L. M.: *Am. Rev. Tuberc.*, 1923, 8, 138-62.
- 29 Berchon and Perrier: [Quoted by Corsy.]
- 30 Bergonzini, C.: *Anat. Anz.*, 1891, 6, 595-600.
- 31 Berneaud: *Folia haematol.*, 1914-15, 19, Arch., 132-47.
- 32 Besegh: *Jahresb. über Leistungen der Vet. Med.*, 1898, 18.
- 33 Bethe, M.: *Inaug. Diss. Strassburg*, 1891; *Also*, *Schwalke's Morphol. Arb.*, 1892, 7, 207.
- 34 Bettmann, S.: *Beitr. z. path. Anat. u. z. allg. Path.*, 1898, 23, 377-443.
- 35 Bézanson, F., and Labbé, M.: *Traité d'hématologie*. Paris, 1904.
- 36 Biber, K.: *Untersuchungen über das Verhalten der Leukocytenzahl im Rinderblut*. Egel, 1908.
- 37 Bidault, C.: *Bull. Soc. centr. de méd. vét.*, Par., 1904, 58, 315-17.
- 38 —————: *Bull. Soc. centr. de méd. vét.*, Par., 1904, 58, 671-87.
- 39 —————: *Rec. de méd. vét.*, Par., 1904, No. 20.
- 40 —————: *Arch. de méd. expér. et d'anat. path.*, 1904, 16, 355-74.

- 41 Biedl, A., and von Decastello, A.: Arch. f. d. ges. Physiol., 1901, 86, 259-90.
- 42 Biffi, U.: Arch. di fisiol., 1905-06, 3, 557-571. [Abstr. in Folia haematol., 1907, 4, suppl., 324-325.]
- 43 ———: Bol. Acad. nac. de med. de Lima, 1904, 4, 37-63.
- 44 Bittner, A.: Folia haematol., 1913, 15, Arch., 237-315.
- 45 Bizzozero, G.: Arch. per le sci. med., 1891, 15, 425-45.
- 46 ———: Virchow's Arch., 1882, 90, 261-332.
- 47 ———, and Salvioli, G.: Arch. per le sci. med., 1880-81, 4, 49-66.
- 48 Bloch, E.: Deutsches Arch. f. klin. Med., 1903, 77, 277-307.
- 49 Blumenthal, R., and Morawitz, P.: Deutsches Arch. f. klin. Med., 1908, 92, 25-53.
- 50 Boycott, A. E.: J. Path. & Bact., 1910, 14, 605-14.
- 51 ———: J. Path. & Bact., 1912, 16, 485-501.
- 52 ———, and Douglas, C. G.: J. Path. & Bact., 1909, 13, 414-28.
- 53 ———: J. Path. & Bact., 1910, 14, 294-327.
- 54 ———, and Price-Jones, C.: J. Path. & Bact., 1912-13, 17, 347-66.
- 55 Brasch, M.: Ztschr. f. exper. Path. u. Therap., 1912, 10, 381-411.
- 56 Breuer, R., and von Seiller, R.: Arch. f. exper. Path. u. Pharmakol., 1903, 50, 169-98.
- 57 Brinchmann, A.: Acta Med. Scandin., 1920, 52, 689-772.
- 58 Brinckerhoff, W. R., and Tyzzer, E. E.: J. Med. Research, 1902, 7, 173-90.
- 59 ———: J. Med. Research, 1902, 7, 191-201.
- 60 ———: J. Med. Research, 1902, 8, 449-95.
- 61 Brodin, P., Richet, C., and Saint-Girons, F.: J. de physiol. et de path. gén., 1919, 18, 27-32.
- 62 ———: Compt. rend. Soc. de biol., 1918, 81, 681-84.
- 63 Bruce, D.: Proc. Roy. Soc. Lond., 1894, 55, 295-99.
- 64 Bucalossi, A.: Arch. ed atti d. Soc. ital. di chir., 1908-09, 1, 495-529.
- 65 Buffington, R. M.: Thesis. N. Y. State Vet. College, 1905.
- 66 Bunting, C. H.: Univ. Med. Bull.-Univ. of Penna., 1904, 16, 200-16.
- 67 ———: Johns Hopkins Hosp. Bull., 1905, 16, 222-28.
- 68 ———: J. Exper. Med., 1906, 8, 625-46.
- 69 ———: Am. J. Med. Sci., 1911, 142, 698-702.
- 70 ———: Physiol. Rev., 1922, 2, 505-20.
- 71 ———, and Huston, J.: J. Exper. Med., 1921, 33, 593-600.
- 72 Bürker, K.: Arch. f. d. ges. Physiol., 1904, 105, 480-535.
- 73 ———: Ztschr. f. biol. Technik u. Methodik, 1908-09, 1, 176-79.
- 74 ———: Monogr. in Tigerstedt's Handb. d. physiol. Methoden, 1913, 2, 57.
- 75 ———, Ederle, R., and Kircher, F.: Zentralbl. f. Physiol., 1913, 27, 623-27.
- 76 Burket, W. C.: J. Exper. Med., 1917, 26, 849-65.
- 77 Burnett, S. H.: Am. Vet. Rev., 1902, 26, 311-25.
- 78 ———: Am. Vet. Rev., 1903-04, 27, 804-20.
- 79 ———: J. Med. Research, 1904, 11, 537-51.
- 80 ———: The clinical pathology of the blood of domesticated animals. New York, 1917.

- 81 ———, and Traum, J.: Proc. Am. Vet. M. Assoc., 1905, 42, 349-62.
- 82 Burton-Opitz, R.: Arch. f. d. ges. Physiol., 1900, 82, 447-63.
- 83 ———: J. Physiol., 1904-05, 32, 8-17.
- 84 ———: J. Physiol., 1904-05, 32, 385-89.
- 85 Busch, F. C., and Van Bergen, C.: J. Med. Research, 1902, 8, 408-14.
- 86 ———: J. Med. Research, 1903, 10, 250-54.
- 87 Butterfield, E. E.: Ztschr. f. physiol. Chem., 1909, 62, 173-225.
- 88 Cabot, R. C.: Clinical examination of blood. New York, 1904.
- 89 Canavan, M. M.: J. Med. Research, 1912-13, 27, 189-203.
- 90 Cannon, W. B., and Mendenhall, W. L.: Am. J. Physiol., 1914, 34, 225-31.
- 91 Cantacuzène, J.: Ann. de l'Inst. Pasteur, 1900, 14, 378-89.
- 92 Cesaris-Demel, A.: Folia haematol., 1907, 4, suppl., 1-45.
- 93 ———: Virchow's Arch. f. path. Anat., 1909, 195, 1-92.
- 94 Charron: Rec. de méd. vét., 1907, Nov.
- 95 Chauffard, A., and Fiessinger, H.: Compt. rend. Soc. de biol., 1907, 63, 672-73.
- 96 Chisholm, R. A.: Quart. J. Exper. Physiol., 1911, 4, 207-99.
- 97 Cohnstein, J.: Arch. f. d. ges. Physiol., 1884, 34, 233-36.
- 98 ———, and Zuntz, N.: Arch. f. d. ges. Physiol., 1884, 34, 173-233.
- 99 ———: Arch. f. d. ges. Physiol., 1888, 42, 303-41.
- 100 Corin, G.: Soc. méd.-chir. de Liège, 1894, 33, 327-34.
- 101 Cornwall, J. W.: J. Hyg., 1912, 12, 245-58.
- 102 Corper, H. J., and Gauss, H.: Tr. Nat. Tuberc. Ass., 1920, 16, 354-59.
- 103 Corsy, F.: Les éléments figures du sang chez les animaux de laboratoire: Cobaye, Lapin, Rat, Chien, et Chat. Montpellier, 1911.
- 104 Courmont and Lesieur: [Quoted by Furno.]
- 105 Courmont, J., and Montagard, V.: Actual. Med., Masson, 1903. Also, Arch. Med., 1903; also, J. de physiol. et de path., 1900-1901.
- 106 Cozette: Rec. de méd. vét., 1904, No. 16.
- 107 Cramer: [Quoted by Haven.]
- 108 Cramer, W., and Drew, A. H.: Brit. J. Exper. Path., 1923, 4, 271-82.
- 109 ———, and Mottram, J. C.: Lancet, 1921, i, 963-64.
- 110 ———: Proc. Roy. Soc., Lond., 1922, 93, 449-67.
- 111 ———: Brit. J. Exper. Path., 1923, 4, 37-44.
- 112 Cullen, E. K.: Johns Hopkins Hosp. Bull., 1903, 14, 352-56.
- 113 Czerny, A.: Arch. f. exper. Path. u. Pharmakol., 1894, 34, 268-80.
- 114 Dallwig, H. C., Kolls, A. C., and Loevenhart, A. S.: Am. J. Physiol., 1915-16, 39, 77-108.
- 115 Danilewsky, B., and Selensky, M.: Arch. f. d. ges. Physiol., 1895, 61, 264-74.
- 116 Daubler: Vrtljschr. f. gerichtl. Med., 1899, 17, 258.
- 117 David, O.: Deutsches Arch. f. klin. Med., 1912, 109, 129-50.
- 118 Davis, B. F., and Carlson, A. J.: Am. J. Physiol., 1909-10, 25, 173-89.
- 119 Dawson, P. M.: Am. J. Physiol., 1900-01, 4, 1-24.
- 120 Deetjen, H.: Ztschr. f. physiol. Chem., 1909, 63, 1-26.
- 121 Dekhuyzen, M. C.: Anat. Anz., 1901, 19, 529-40.
- 122 Delafond: [Quoted by Meier, P.]
- 123 Delezenne, C.: Arch. de physiol. norm. et path., 1897, 9, 333-52.

- 124 Dimock, W. W., and Thompson, M. C.: *Am. Vet. Rev.*, 1906-07, 30, 553-59.
- 125 Dinwiddie, R. R.: *Ark. Agr. Exp. Sta. Bull.*, 1914, 120, 21-41.
- 126 Dobbertin: *Blutuntersuchungen beim Hunde. Inaug.-Diss., Leipzig.* [Quoted by Luetje.]
- 127 Domarus, A. von: *Arch. f. exp. Path. u. Pharmakol.*, 1908, 58, 319-42.
- 128 Dominici, M.: *Compt. rend. Soc. de biol.*, 1899, 51, 168-70.
- 129 ———, Cornil, V., and Ranvier, L.: *Manuel d'histologie pathologique*, Paris, 1902, 2, 586.
- 130 ———: *Arch. de méd. expér. et d'anat. path.*, 1902, 14, 1-72; *Also*, *Compt. rend. Soc. de biol.*, 1900.
- 131 Dorst, S. E., and Mills, C. A.: *Am. J. Physiol.*, 1923, 64, 160-66.
- 132 Douglas, C. G.: *J. Physiol.*, 1905-06, 33, 493-505.
- 133 Downey, H.: *Folia haematol.*, 1913, 16, Arch., 49-74.
- 134 ———: *Folia haematol.*, 1914-15, 19, Arch., 148-206.
- 135 Downs, A. W., and Eddy, N. B.: *Am. J. Physiol.*, 1917, 43, 415-28.
- 136 ———: *Am. J. Physiol.*, 1920, 51, 279-88.
- 137 Drake, A. K.: *J. Med. Research*, 1902, 8, 255-67.
- 138 Dreyer, G., and Ray, W.: *Phil. Tr. Lond.*, 1910, 201, 133-60.
- 139 ———: *Phil. Tr. Lond.*, 1911-12, 202, 191-212.
- 140 ———, and Walker, E. W. A.: *J. Path. & Bact.*, 1912, 17, 143-46.
- 141 ———: *Proc. Path. Soc. Gr. Brit. and Ireland*, 1912-13, 17, 143-46.
- 142 ———: *Skandin. Arch. Physiol.*, 1913, 28, 299-324.
- 143 Drinker, C. K., Drinker, K. R., and Kreutzmann, H. A.: *J. Exper. Med.*, 1918, 27, 249-72.
- 144 ———: *J. Exper. Med.*, 1918, 27, 383-97.
- 145 ———, and Lund, C. C.: *Am. J. Physiol.*, 1922, 62, 1-92.
- 146 Du Toit, P. J.: *Beitrag zur Morphologie des normalen und des leukaemischen Rinderblutes. Vet. Med. Diss., Berlin*, 1916.
- 147 Dudgeon, L. S., and Ross, A.: *Tr. Path. Soc. Lond.*, 1906, 57, II, 155-295.
- 148 Duke, W. W.: *Arch. Int. Med.*, 1912, 10, 445-69.
- 149 ———: *Arch. Int. Med.*, 1913, 11, 100-20.
- 150 Durham, H. E.: *J. Path. & Bact.*, 1897, 4, 338-82.
- 151 Durroux, P. P. D.: *Contribution a l'étude du sang des equides; rapports leucocytaires du sang du cheval. Bordeaux*, 1908, Thesis No. 140.
- 152 Eberth, C. J., and Schimmelbusch, C.: *Die Thrombose nach Versuchen und Leichenbefunden. Stuttgart*, 1888.
- 153 Eddy, N. B.: *Endocrinology*, 1921, 5, 461-75.
- 154 Egger, F.: *Arch. f. exper. Path. u. Pharmakol.*, 1897, 39, 426-40.
- 155 Ehrlich, P.: *Farbenanalytische Untersuchungen. Zur Histologie und Klinik des Blutes. Berlin*, 1891.
- 156 ———: *Ztschr. f. klin. Med.*, 1880, 1, 553-60.
- 157 ———: *Über die spezifischen Granulationen des Blutes. Arch. f. Anat. u. Physiol., physiol. Abt.*, 1879, 571.

- 158 ———, and Lazarus, A.: Histology of blood. [Trans. by Myers, Cambridge, 1900.]
- 159 ———: Die Anaemie—Normale und pathologische Histologie des Blutes. Spezielle Pathologie u. Therapie. Wien, 1898. [Trans. by Myers as Histology of the Blood. Cambridge, 1900.]
- 160 Ellermann, V., and Bang, O.: Centralbl. f. Bakt., 1908, 46, 595-609.
- 161 Emden, J. E. G. van: Fortschr. d. Med., 1898, 16, 281-95.
- 162 Engel, C. S.: Anat. Anz., 1906, 29, 144-47.
- 163 Ewing, J.: New York Med. J., 1895, 61, 257-63.
- 164 Fabricius-Moeller, J.: Compt. rend. Soc. de biol., 1922, 87, 759-61. Also, Monograph in Danish, Copenhagen, 1922.
- 165 Fatham: [Quoted, but no reference given.]
- 166 Feirtag, H.: Beobachtungen über die sogenannten Blutplättchen. Inaug.-Diss., Dorpat, 1883.
- 167 Ferrata, A.: Sitzungsber. d. Berl. haematol. Gesellsch., 1910, 1, 98-115.
- 168 ———, and Boselli, S.: Folia haematol., 1910, 10, Arch., 451-58.
- 169 Fiessinger: [Quoted by Corsy.]
- 170 Filinski, W.: Compt. rend. Soc. de biol., 1924, 91, 968-70.
- 171 Findlay, G. M.: J. Path. & Bact., 1921, 24, 446-53.
- 172 Fischer, P.: Berl. tierärztl. Wchnschr., 1894, No. 23, 267-69.
- 173 Fish, P. A.: Am. Vet. Rev., 1903, 27, 716.
- 174 Foix, C., and Salin, H.: Arch. de méd. expér. et d'anat. path., 1912, 24, 305-51.
- 175 Formad, H. F.: Comparative studies of mammalian blood, with special reference to the microscopical diagnosis of blood stains in criminal cases. Phila., 1888.
- 176 Frank, W.: Tierärztliche Geburtshilfe. 1901. [Quoted by Turowski.]
- 177 ———: Monatsh. f. prakt. Tierheilk., 1907, 19, 98-120.
- 178 Freytag, F.: Arch. f. d. ges. Physiol., 1907, 120, 517-64.
- 179 Friedberg, H.: Histologie des Blutes mit besonderer Rücksicht auf die forensische Diagnostik. Berlin, 1852.
- 180 Friedberger, F., and Froehner, E.: Klinische Untersuchungsmethoden für Tierärzte. 1907. [See also, Zuill, W. L.]
- 181 Fritsch, G.: Arch. f. d. ges. Physiol., 1920, 181, 78-105.
- 182 Fry, H. K.: Quart. J. Exper. Physiol., 1913, 7, 185-92.
- 183 Fua, R.: Folia clin. chim. e microsc., Salsomaggiore, 1910-11, 3, 44-52.
- 184 Furno, A.: Folia haematol., 1911, 11, Arch., 219-52.
- 185 ———: Sperimentale, 1913, 67, 639-752.
- 186 Gabbi, U.: Beitr. z. path. Anat. u. z. allg. Path., 1893, 14, 351-69.
- 187 ———: Beitr. z. path. Anat. u. z. allg. Path., 1896, 19, 647-62.
- 188 Gasse, G. E. R.: Diss. Giessen; Stuttgart, 1907.
- 189 Giltner, W.: J. Comp. Path. & Therap., 1907, 20, 18-23.
- 190 ———: Am. Vet. Rev., 1908, 33, 557.
- 191 Gladin, G. P.: Bolnitsch. Gaz. Botkina., St. Petersburg, 1901, 12, 1369.
- 192 Goldhorn, L. R.: Proc. Path. Soc. New York, 1905, 9-14.
- 193 Goldscheider, A., and Jacob, P.: Ztschr. f. klin. Med., 1894, 25, 373-448.
- 194 Goodall, A.: J. Path. & Bact., 1910, 14, 195-99.
- 195 ———, Gulland, G. L., and Paton, D. N.: J. Physiol., 1904, 30, 1-9.
- 196 Gotze: [Quoted by Gasse.]

- 197 Grawitz, E.: *Klinische Pathologie des Blutes und spezielle Pathologie und Therapie der Blutkrankheiten*. Berlin, 1902.
- 198 Grigorescu, G.: *Compt. rend. Soc. de biol.*, 1887, 39, 548-50.
- 199 Grosso, G.: *Folia haematol.*, 1912-13, 14, Arch., 13-17.
- 200 Gruber, G. B.: *Arch. f. exper. Path. u. Pharmakol.*, 1908, 58, 289-318.
- 201 Gruenberger, C.: *Virchow's Arch. f. path. Anat.*, 1901, 163, 303-42.
- 202 Gulland, G. L., and Goodall, A.: *The Blood*. Edinburgh and London, 1912.
- 203 Gulliver, G.: *Proc. Zool. Soc. Lond.*, 1840, 42-5.
- 204 ———: *Proc. Zool. Soc. Lond.*, 1875, 474-95.
- 205 Gütig, K.: *Arch. f. mikr. Anat.*, 1907, 70, 629-94.
- 206 Hahl's *Archiv*. [Quoted by Luetje.]
- 207 Haldane, J.: *J. Physiol.*, 1900-01, 26, 497-504.
- 208 Hamburger, F., and von Reuss, A.: *Ztschr. f. Biol.*, 1906, 47, 24-41.
- 209 Hammett, F. S., and Nowrey, J. E.: *J. Exper. Med.*, 1922, 35, 507-13.
- 210 ———, and Muller, J. H.: *J. Exper. Med.*, 1922, 35, 173-80.
- 211 Hardy, W. B., and Kong, L. B.: *J. Physiol.*, 1894, 15, 361-74.
- 212 Harris, D. F.: *J. Physiol.*, 1904, 30, 319-21.
- 213 Hawes, J. B.: *Boston Med. & Surg. J.*, 1909, 161, 493-99.
- 214 Hayem, G.: *Compt. rend. Soc. de biol.*, 1878, 5, 134-36.
- 215 ———: *Compt. rend. Acad. de sci.*, 1883, 97, 458-61.
- 216 ———: *Du sang et de ses altérations anatomiques*. Paris, 1889, 169.
- 217 ———: *Compt. rend. Soc. de biol.*, 1899, 51, 623-24.
- 218 Hedfeld, E.: *Untersuchungen über die körperlichen Elemente des Blutes gesunder und kranker Hühner und Tauben*. *Vet. Med. Dissert.*, Hannover, 1911, 22.
- 219 Heidenhain, M.: [Quoted by Grüber.]
- 220 Heinecke, H.: *Deutsches. Ztschr. f. Chir.*, 1901, 58.
- 221 ———: *Mitt. a. d. Grenzgeb. d. Med. u. Chir.*, 1905, 14, 21-94.
- 222 Heinz, R.: *Beitr. z. path. Anat. u. z. allg. Path.*, 1901, 29, 299-404.
- 223 ———: *Virchow's Arch. f. path. Anat.*, 1902, 168, 485-500.
- 224 Heissler: *Arb. a. d. path. Inst. zu München*. Stuttgart, 1886, 322.
- 225 Hektoen, L., and Eggers, H. E.: *J. Am. Med. Asso.*, 1911, 57, ii, 1833-35.
- 226 Helber, E., and Linser, P.: *München. med. Wchnschr.*, 1905, 52, i, 689-91.
- 227 Héricourt, J., and Richet, C.: *Compt. rend. Soc. de biol.*, 1893, 5, 187-92.
- 228 Herrick, W. W.: *Arch. Int. Med.*, 1913, 11, 165-86.
- 229 Heyl and Krueger: *St. Petersburg. Med. Wchnschr.*, 1893, No. 39. [Quoted by Turowski.]
- 230 Hibbard, R. P., and Neal, D. C.: *J. Infect. Dis.*, 1911, 9, 324-42.
- 231 Hirschfeld, H.: *Abst. in Centralbl. f. allg. Path. u. path. Anat.*, 1897, 8, 839-40.
- 232 ———: *Virchow's Arch. f. path. Anat.*, 1897, 149, 22-51; *Also, Dissertation*, Berlin, 1897.
- 233 ———: *Virchow's Arch. f. path. Anat.*, 1898, 153, 335-47.
- 234 ———: *Berl. klin. Wchnschr.*, 1909, 46, i, 314-15.
- 235 ———, and Jacoby, M.: *Berl. klin. Wchnschr.*, 1909, 46, i, 159-60.
- 236 Hofmann, G.: *Klinische Untersuchungen über den Haemoglobingehalt des Blutes*. *Vet. Med. Dissert.* (Giessen), Nürnberg, 1911.
- 237 Holz, R.: *Dissert. Dorpat*, 1891. [Quoted by Storch.]

- 238 Hooper, C. W., and Whipple, G.: *Am. J. Physiol.*, 1916, 40, 332-48.
 239 ————: *Am. J. Physiol.*, 1917, 43, 275-97.
 240 Hoppe-Seyler, F.: *Ztschr. f. physiol. Chem.*, 1892, 16, 505-13.
 241 Howard, C. P.: *J. Med. Research*, 1907-08, 17, 237-69.
 242 Howell, W. H.: *J. Morphol.*, 1890, 4, 57-116.
 243 Hünerfauth, G.: *Virchow's Arch. f. path. Anat.*, 1879, 76, 310-30.
 244 Hunter, W.: *J. Anat. & Physiol.*, 1887, 21, 264-88; 450-72.
 245 ————: *Univ. Med. Bull., Univ. of Penna.*, 1909-10, 22, 333-36.
 246 Hürthle, K.: *Arch. f. d. ges. Physiol.*, 1900, 82, 415-42.
 247 Hussey, R. G.: *J. Exper. Med.*, 1921, 33, 337-48.
 248 Hyde, R. R.: *Am. J. Hyg.*, 1924, 4, 169-87.
 249 Ilberg, F.: *Das Blut des Menschen und der Thiere in forensischer Beziehung mit besonderer Berücksichtigung der neutrophilen Granulationen.* Dissert., Berlin, 1895.
 250 Itami, S.: *Arch. f. exper. Path. u. Pharmakol.*, 1909, 60, 76-98.
 251 ————, and Pratt, J.: *Biochem. Ztschr.*, 1909, 18, 302-16.
 252 Jaquet, A., and Suter, F.: *Cor.-Bl. f. schweiz. Aerzte*, 1898, 28, 104-16.
 253 Jawein, G.: *Virchow's Arch. f. path. Anat.*, 1900, 161, 461-508.
 254 Jolly, J.: *Compt. rend. Soc. de biol.*, 1900, 52, 710-11.
 255 ————: *Compt. rend. Soc. de biol.*, 1905, 58, 528-31.
 256 ————: *Compt. rend. Soc. de biol.*, 1906, 61, 393-95.
 257 ————: *Arch. d'anat. micr.*, 1907, 9, 133.
 258 ————: *Compt. rend. Soc. de biol.*, 1909, 66, 136-39.
 259 ————: *Compt. rend. Soc. de biol.*, 1919, 82, 800-2.
 260 ————, and Acuma, M.: *Congres du Buenos Aires*, 1904, April; *Also*, *Arch. d'anat. micr.*, 1905, 7, 257-69.
 261 ————, and Stini, J.: *Compt. rend. Soc. de biol.*, 1905, 58, 835-37.
 262 ————: *Compt. rend. Soc. de biol.*, 1905, 59, 207-9.
 263 ————, and Vallee, A.: *Lab. d'histol. du Coll. de France*, 1907, 22, 201-4; *Also*, *Compt. rend. Soc. de biol.*, 1906, 61, 350-52.
 264 Jolyet and Lafond: [Quoted by Corsy.]
 265 Jones, C. P.: *J. Path. & Bact.*, 1910, 14, 218-23.
 266 ————: *J. Path. & Bact.*, 1911, 15, 4-19.
 267 ————: *J. Path. & Bact.*, 1911-12, 16, 48-70.
 268 Jones, W.: *Phil. Trans. Lond.*, 1846, 64.
 269 Jordan, H. E.: *Am. J. Anat.*, 1919, 25, 437-74.
 270 ————, and Speidel, C. C.: *Am. J. Anat.*, 1923, 32, 155-76.
 271 ————: *Proc. Soc. Exper. Biol. & Med.*, 1922-23, 20, 380-83.
 272 Jorgensen, G.: *Skandin. Arch. f. Physiol.*, 1916, 33, 253-62.
 273 Kanthack, A. A., and Hardy, W. B.: *Proc. Roy. Soc. Lond.*, 1892-93, 52, 267-73; *Also*, *Phil. Tr. Lond.*, 1894, 185, I, 279-318.
 274 ————: *J. Physiol.*, 1894-95, 17, 81-119.
 275 Kasarinoff: *Folia haematol.*, 1910, 10, *Arch.*, 391-413.
 276 Kaupp, B. F. J.: *J. Comp. Med. & Surg.*, 1899, 20, 339-42.
 277 Kemp and Calhoun: *Arch. ital. di biol.*, 1901, 36, 83.
 278 King, W. E., and Wilson, R. H.: *Kans. State Agr. Col. Exper. Sta. Bull.*, 1910, 171.
 279 Kinghorn, H. M.: *J. Med. Research*, 1902, 8, 329-43.

- 280 Kinyoun, J. J.: *Science*, 1907, 25, 810-11.
- 281 Klieneberger, C., and Carl, W.: *Die Blut-Morphologie der Laboratoriums-Tiere*. Leipzig, 1912.
- 282 Knight, R. F.: Thesis, N. Y. State Vet. Coll., 1907.
- 283 Korke, V. T.: *Ann. Trop. Med. & Parasitol.*, 1911, 5, 127-31.
- 284 Kosokabe: *Folia haematol.*, 1923, 29, Arch., 264-272.
- 285 Krause, W.: *Die Anatomie des Kaninchens in topographischer und operativer Rücksicht*. Leipzig, 1868.
- 286 Kruger: *St. Petersburg. Med. Wchnschr.*, 1893, No. 39.
- 287 Krumbhaar, E. B.: *Ann. Surg.*, 1917, 66, 133-42.
- 288 ———, Pearce, and Frazier: *The Spleen and Anemia*. Lippincott, 1919, Phila.
- 289 ———: *J. Lab. & Clin. Med.*, 1922, 8, 11-18.
- 290 ———, and Chanutin, A.: *J. Exper. Med.*, 1922, 35, 847-71.
- 291 ———, and Musser, J. H.: *J. Exper. Med.*, 1914, 20, 108-21.
- 292 ——— ———: *J. Med. Research*, 1921, 42, 105-9.
- 293 ——— ———: *Arch. Int. Med.*, 1923, 31, 686-700.
- 294 ——— ———, and Pearce, R. M.: *J. Exper. Med.*, 1913, 18, 665-77.
- 295 Kuhl, P.: *Arch. f. d. ges. Physiol.*, 1919, 176, 1-24; *Also*, Dissert. Giessen; Berlin, 1919.
- 296 Kuln: *Saechs. vet. Bericht.*, 1902, 108.
- 297 Kunth, K., and Volkmann, O.: *Ztschr. f. Hyg. u. Infektionskrankh.*, 1916, 393-467.
- 298 Kurloff: [Quoted by Ehrlich and Lazarus. *Die Anaemie. Spec. Path. u. Therapie*, 1898, 8, 56.]
- 299 Lacapère: Thesis, Paris, 1902. [Quoted by Corsy.]
- 300 Laker, C.: *Virchow's Arch. f. path. Anat.*, 1900, 116, 28-48.
- 301 Lamson, P. D.: *J. Pharmacol. & Exper. Therap.*, 1915, 7, 169-224.
- 302 ———: *J. Pharmacol. & Exper. Therap.*, 1916, 8, 167-73.
- 303 Lange: *Zool. Jahrb.*, 1919, 36, 657.
- 304 Lapique, L.: *Compt. rend. Soc. de biol.*, 1902, 54, 949-52.
- 305 Laudenbach, J.: *Arch. de physiol.*, 1897, 9, 200-15.
- 306 ———: *Arch. de physiol.*, 1897, 9, 385-411.
- 307 Launoy, L., and Levy-Bruhl, M.: [Quoted without reference.]
- 308 Leake, C. D.: *J. Pharmacol. & Exper. Therap.*, 1923, 22, 109-15.
- 309 ———, and Leake, E. W.: *J. Pharmacol. & Exper. Therap.*, 1923, 22, 75-88.
- 310 Ledingham, J. C. G.: *Lancet*, 1906, *i*, 1675-76.
- 311 ———, and Bedson, S. P.: *Lancet*, 1915, *i*, 311-16.
- 312 Lee, R. I., and Robertson, O. H.: *J. Med. Research*, 1916, 33, 323-36.
- 313 ———, Minot, G. R., and Vincent, B.: *J. Am. Med. Asso.*, 1916, 67, 719-23.
- 314 Lenze, P.: *Ein Beitrage zur Form und Formveränderung der Erythrocyten und ihr Verhältnis zu den Blutplättchen bei unseren Haustieren*. Arnswalde, 1909.
- 315 Lesbre: *Éléments d'histologie*. [Quoted by Durroux.]
- 316 Levaditi, C.: *Presse méd.*, 1899.

- 317 ———: *Collect. Scientia*, 1902.
- 318 ———: *Inaug.-Diss.*, Paris, 1901-2, No. 183.
- 319 Lewis, F. T.: *J. Med. Research*, 1904, *10*, 513-17.
- 320 Lewis, L. L., Shular, W. P., McElroy, C. H., and Ritter, L. B.: *Okla. Agr. Exper. Sta. Bull.*, 1914, No. 104, 130.
- 321 Lewis, T.: *J. Anat. & Physiol.*, 1904, *38*, 144-57.
- 322 Lienaux: *Rec. de méd. vét.*, 1902.
- 323 Limbeck, R. von: *Ztschr. f. Heilk.*, 1889, *10*, 392-457.
- 324 ———: *The clinical pathology of the blood*. London, 1901. [Trans. of 2nd German edition.]
- 325 Lindberg, G.: *Folia haematol.*, 1910, *9*, Arch., 64-80.
- 326 ———: *Upsala Läkaref. Förh.*, 1910, *15*, 177-200.
- 327 Linsler, P., and Helber, E.: *Deutsches Arch. f. klin. Med.*, 1905, *83*, 479-98.
- 328 Loewenthal, N.: *J. de l'anat. et de la physiol.*, 1909, *45*, 97-121.
- 329 Löwit, M.: *Folia haematol.*, 1907, *4*, 473-98.
- 330 ———: *Studien zur Physiologie und Pathologie des Blutes und Lymphes*. Jena, 1892.
- 331 Lucas, W. P., and Prizer, E. L.: *J. Med. Research*, 1912, *26*, 181-94.
- 332 Luden, G.: *Internat. Ass. M. Mus.*, 1916, 73-92.
- 333 Lütje, H.: *Arch. exper. Path. u. Pharmakol.*, 1902, *48*, 184-222.
- 334 Lütje, J. K. F.: *Untersuchungen über die körperlichen Elemente des Blutes normaler und schweinepestkranker Schweine*. *Dissert. Giessen. Göttingen*, 1911.
- 335 Lyon: [Quoted by Storch.]
- 336 Lyon, J. F.: *Virchow's Arch. f. path. Anat.*, 1881, *84*, 207-47.
- 337 Lyon, M. W.: *J. Infect. Dis.*, 1918, *22*, 49-52.
- 338 Mack: [Quoted by Burnett.]
- 339 Magnan, A.: *Compt. rend. Soc. de biol.*, 1911, *71*, 495-96.
- 340 Malassez, L.: *Compt. rend. Acad. des Sci.*, 1872, *75*, 1528-31.
- 341 ———: *Arch. de physiol. norm. et path.*, 1874, *1*, 797-810.
- 342 ———: *Arch. de physiol. norm. et path.*, 1875, *2*, 261-80.
- 343 ———, and Picard, M.: *Gazette méd. de Par.*, 1878, *7*, 317-18.
- 344 Manassein, V.: *Über die Dimension der rothen Blutkörperchen unter verschiedenen Einflüssen*. *Inaug.-Diss. Tübingen*, 1872.
- 345 Mandl, L.: *Ann. d. Sci. nat.*, 1839, *12*, 289-91.
- 346 Mann, F.: [Unpublished data. Quoted by Luden.]
- 347 ———: *Surg. Gynec. & Obst.*, 1915, *21*, 430-44.
- 348 ———: *J. Am. Med. Asso.*, 1916, *67*, 172-75.
- 349 Marie, P. L.: [Quoted by Corsy.]
- 350 Marloff, R.: *Arch. f. d. ges. Physiol.*, 1919, *175*, 355-70.
- 351 Mas and Magro, F.: *Arch. de cardiol. y hematol.*, 1923, *4*, 225-45.
- 352 ———: *Arch. de cardiol. y hematol.*, 1923, *4*, 275-315.
- 353 Massart, J., Everard, C., and DeMoor, J.: *Ann. de l'Inst. Pasteur*, 1893, *7*, 165-212.
- 354 Maurer, E., Diez, S., and Berendt, T.: *Klin. Wchnschr.*, 1925, *4*, i, 1869-70.
- 355 Mauriac, P., and Moureau, M.: *J. de méd. de Bordeaux*, 1923, *95*, 39-43.
- 356 Maximow, A.: [Quoted by Lenze.]

- 357 McJunkin, F. A., and Charlton, A.: Arch. Int. Med., 1918, 22, 157-59.
358 —————: Arch. Int. Med., 1919, 24, 295-301.
359 Meed, W. J., and Gasser, H. S.: Am. J. Physiol., 1918, 47, 302-17.
360 Meier, P.: Beiträge zur vergleichenden Blutpathologie. Vet. med. Diss., Zurich, 1905.
361 Meinertz, J.: Virchow's Arch. f. path. Anat., 1902, 168, 353-98.
362 Metschnikow: Immunität der Infektionskrankheiten. Jena, 1902. [Quoted by Lütje.]
363 Meyer, S.: Folia haematol., 1924, 30, Arch., 195-229.
364 Mezincescu: Arch. de méd. expér. et d'anat. path., 1904, 16, 355-74.
365 —————: Arch. de méd. expér. et d'anat., path., 1902, 14, 266-76.
366 —————: Arch. de méd. expér. et d'anat., path., 1902, 14, 562-75.
367 Mikrukow: Compt. rend. Charkower Vet. Inst., 1891. Abst. Jahresber. vet. Med., 1891, 11, 33.
368 Milne-Edwards, A.: Ann. d. sci. nat., 1856, 5, 165-67.
369 Milroy, T. H., and Malcolm, J.: J. Physiol., 1899, 25, 105-30.
370 Minot, G. R., and Lee, R. I.: Bost. Med. & Surg. J., 1917, 177, 761-75.
371 Mohler, J. R., and Washburn, A. J.: Bur. An. Indust., U. S. Dept. Agr., 1913, Bull. 95.
372 Moncalvi, L.: Boll. d. Soc. med.-chir. di Pavia, 1908, 22, 37-48.
373 Moore, V. A.: Bur. An. Industr., U. S. Rep., 1895-6, 12-13, 185-205.
374 —————, Haring, C. M., and Cady, B. J.: Proc. Am. Vet. M. Ass., 1904, 284.
375 Morris, R. S.: Johns Hopkins Hosp. Bull., 1907, 18, 198-200.
376 —————: Johns Hopkins Hosp. Bull., 1907, 18, 200-7.
377 Moss, W. L., and Brown, G. L.: Johns Hopkins Hosp. Bull., 1911, 22, 258-68.
378 Mosse, M., and Rothmann, M.: Deutsche med. Wchnschr., 1906, 32, 187-89.
379 Mottram, J. C., and Russ, S.: Proc. Roy. Soc. Lond., 1917, 90, 1-33.
380 —————: J. Exper. Med., 1921, 34, 271-73.
381 Muir, R.: J. Anat. & Physiol., 1891, 25, 256-77.
382 —————: J. Path. & Bact., 1901, 7, 161-83.
383 —————, and Dunn, J. S.: J. Path. & Bact., 1914-15, 19, 417-28.
384 —————: J. Path. & Bact., 1915-16, 20, 41-9.
385 —————, and M'Nee, J. W.: J. Path. & Bact., 1912, 16, 410-38.
386 Müller, G. A.: Beitrag zur Kenntnis des Oxyhaemoglobins im Blute der Haussäugetiere und des Hausgeflügels. Leipzig, 1886.
387 Müller, H. F.: Centralbl. f. allg. Path. u. path. Anat., 1896, 7, 529-39.
388 Müller, J. H., and Iszard, M. S.: Am. J. Med. Sci., 1922, 163, 364-84.
389 Müntz, A.: Compt. rend. Acad. d. sci., 1891, 112, 298-301.
390 Muratet, L., and Durroux, P.: Gaz. hebd. d. sci. méd. de Bordeaux, 1908, 29, 339.
391 Murphy, J. B., and Sturm, E.: J. Exper. Med., 1919, 29, 1-15.
392 Musser, J. H.: Arch. Int. Med., 1912, 9, 592-600.
393 —————, and Krumbhaar, E. B.: J. Am. Med. Ass., 1916, 67, 1894-96.
394 —————: J. Exper. Med., 1913, 18, 487-93.
395 —————: Folia haematol., 1914, 18, Arch., 576-80.

- 396 —————: Studies from the John Herr Musser Department of Research Medicine of the University of Pennsylvania. Collected Reprints, 1914-16, 3, No. 24. Reprinted from *Folia haematol.*, 1914, 18, Arch., 576-80.
- 397 Nasmith, G. G., and Graham, D. A. L.: *J. Physiol.*, 1906, 35, 32-52.
- 398 —————, and Harrison, F. C.: *J. Exper. Med.*, 1910, 12, 282-87.
- 399 Nassau, E.: *Arch. exper. Path. u. Pharmakol.*, 1914, 75, 123-42.
- 400 Nattan-Larrier, L.: *Compt. rend. Soc. de biol.*, 1907, 63, 771-73.
- 401 Nelson, L.: *Arch. f. exper. Path. u. Pharmakol.*, 1909, 60, 340-44.
- 402 Neumann, E.: *Ztschr. f. klin. Med.*, 1881, 3, 411-49.
- 403 Nice, L. B., Neil, A. J., and Moore, H. D.: *Am. J. Physiol.*, 1923, 65, 101-6.
- 404 Nicholas and Cot: [Quoted by Furno.]
- 405 —————, and Courmont, P.: *Arch. de méd. expér. et d'anat. path.*, 1897, 9, 737-85.
- 406 —————, Froment, and Dumoulin: [Quoted by Furno.]
- 407 —————, and Dumoulin, F.: *J. de physiol. et de path. gén.*, 1903, 5, 819-26.
- 408 —————: *J. de physiol. et de path. gén.*, 1903, 5, 1073-80.
- 409 Niegolewski: *Die Ehrlichsche Granulation der weissen Blutkörperchen bei einigen Tierspezien. Inaug.-Diss. München*, 1894.
- 410 Nocard, and Leclainche: *Maladies microbiennes des animaux domestiques.* [Quoted by Durroux.]
- 411 Nolf, P.: *Ann. de l'Inst. Pasteur*, 1900, 14, 656-85.
- 412 Oczesalski, K., and Sterling, S.: *Deutsches Arch. f. klin. Med.*, 1912, 109, 9-20.
- 413 Okintschitz, E.: *Arch. f. exper. Path. u. Pharmakol.*, 1893, 31, 383-97.
- 414 Opie, E. L.: *Tr. Ass. Am. Physicians*, 1904, 19, 136-63.
- 415 —————: *Am. J. Med. Sci.*, 1904, 127, 217-39.
- 416 —————: *Am. J. Med. Sci.*, 1904, 127, 477-93.
- 417 Orr, T. G.: *J. Lab. & Clin. Med.*, 1916-17, 2, 895-98.
- 418 Osler, W.: *Proc. Roy. Soc. Lond.*, 1874, 22, 391-98.
- 419 Ostrosky, W.: *Quantitative Analysen des Blutes tragender Hunde und Katzen. Diss., Dorpat*, 1892.
- 420 Ottenberg, R., and Hopkins, J. G.: *Proc. Soc. Exper. Biol. & Med.*, 1913-14, 11, 162-66.
- 421 Otto, J. G.: *Arch. f. d. ges. Physiol.*, 1885, 36, 12-72.
- 422 Ouskow, N., and Sélinow, A.: *Arch. des sci. biol. de St. Pétersb.*, 1897, 5, 1-45.
- 423 Palmer, C. C.: *J. Agr. Res.*, 1917-18, 9, 131-40.
- 424 Palmer, W. W.: *J. Biol. Chem.*, 1918, 33, 119-26.
- 425 Panum: [Quoted by Corsy.]
- 426 Pappenheim, A.: *Virchow's Arch. f. path. Anat.*, 1900, 160, 1-19.
- 427 —————, and Ferrata, A.: *Folia haematol.*, 1910, 10, Arch., 78-208.
- 428 Parey, P.: *Lehrbuch der vergleichenden Physiologie der Haussäugetiere.* W. Ellenberger und A. Scheuner, ed. 2, Berlin, 1920, 43.
- 429 Patella, V.: *Berl. klin. Wchnschr.*, 1908, 45, ii, 1846-47.
- 430 Paton, D. N., and Goodall, A.: *J. Physiol.*, 1903, 29, 411-39.

- 431 ———, Gulland, G. L., and Fowler, J. S.: *J. Physiol.*, 1902, 28, 83-106.
- 432 Pearce, R. M., Austin, J. H., and Musser, J. H.: *J. Exper. Med.*, 1912, 16, 758-68.
- 433 ———, and Pepper, O. H.: *J. Exper. Med.*, 1915, 22, 682-93.
- 434 ———, and Peet, M. M.: *J. Exper. Med.*, 1913, 18, 494-99.
- 435 ———, and Pepper, O. H.: *J. Exper. Med.*, 1914, 20, 19-36.
- 436 Pepper, O. H., and Peet, M. M.: *Arch. Int. Med.*, 1913, 12, 81-9.
- 437 Pinzani: [Quoted by Turowski and by Rössle.]
- 438 Pohl, J.: *Arch. f. exp. Path. u. Pharmakol.*, 1889, 25, 31-50.
- 439 Pol, R. A. W.: *Studien zur pathologischen Morphologie der Erythrocyten.* Inaug.-Diss., Heidelberg, 1905.
- 440 Poncet: *J. de méd. vétér.*, 1900, 4, 152-53.
- 441 Pratt, J. H.: *J. Am. Med. Asso.*, 1905, 45, 1999-2003.
- 442 Pröschner, F.: *Folia haematol.*, 1909, 7, 107-15.
- 443 Prus, J.: *Medycyna*, Warszawa, 1886; *Also*, *Centralbl. f. klin. Med.*, 1887.
- 444 ———: *Oesterr. Ztschr. f. wissenschaft. Veterinaerk.*, 1894, 6, 104.
- 445 Putter, A.: *Naturwissenschaften*, 1913, 1, 1029-32.
- 446 Rabl, H.: *Wien. klin. Wchnschr.*, 1896, 9, 1060-62.
- 447 Ranke, J.: *Die Blutverteilung und der Tätigkeitswechsel der Organe.* Leipzig, 1871.
- 448 Rawitz, B.: *Arch. f. mikr. Anat.*, 1899, 54, 481-513.
- 449 ———: *Arch. f. mikr. Anat.*, 1900, 56, 149-68.
- 450 Reckzeh, P.: *Ztschr. f. klin. Med.*, 1904, 54, 165-96.
- 451 Reese, A. M.: *Anat. Record*, 1917, 13, 37-44.
- 452 Refik-Bey: [Quoted without reference.]
- 453 Retterer, E.: *Compt. rend. Soc. de biol.*, 1906, 61, 9-11.
- 454 ———: *Compt. rend. Soc. de biol.*, 1906, 61, 1003-6; *Also*, *J. Anat.*, 1906, 567.
- 455 ———: *Compt. rend. Soc. de biol.*, 1908, 65, 594-96.
- 456 Reusch, W.: *Inaug.-Diss.*, Freiburg, 1911.
- 457 Ribierre, P.: *L'hémolyse et la mesure de la résistance globulaire; application à l'étude de la résistance globulaire dans l'ictère.* Thèse de Paris, 1903.
- 458 Richardson, F. L.: *J. Med. Research*, 1904-05, 13, 99-103.
- 459 Richter, P. F., and Spiro, J.: *Arch. f. exper. Path. u. Pharmakol.*, 1894, 34, 289-302.
- 460 Rieder, H.: *Beiträge zur Kenntniss der Leucocytose und verwandter Zustände des Blutes.* Leipzig, 1892.
- 461 Riess, L.: *Berl. klin. Wchnschr.*, 1879, 16, 696-97.
- 462 ———: *Arch. f. exper. Path. u. Pharmakol.*, 1904, 51, 190-210.
- 463 Rindfleisch, E.: *Pathologische Histologie.* Leipzig, 1867.
- 464 Robert: *Med. Alm. Berl.*, 1896, 93.
- 465 Robertson, O. H., and Rous, P.: *J. Exper. Med.*, 1917, 25, 665-73.
- 466 ———: *J. Exper. Med.*, 1917, 26, 221-37.
- 467 Roger, H., and Josue, O.: *Presse méd.*, 1897, 5, 113-15; *Also*, *Compt. rend. Soc. biol.*, 1897, 4, 322-25.
- 468 Rogers, J. B.: *Tr. Nat. Tuberc. Asso.*, 1920, 16, 363-77.

- 469 Roietzky, von: [Quoted by Ehrlich and Lazarus in *Histology of the Blood*. Cambridge, 1900.]
- 470 Rokitzki: *Modification morphologique du sang chez le chien après l'ablation du pancreas d'Aselli*. Thesis St. Pétersb., 1894.
- 471 Rollat, A.: *In Hermann'sches Handbuch*, 1880, 4, i, 103.
- 472 Rosenthal, F.: *Folia haematol.*, 1910, 10, Arch., 253-76.
- 473 Ross, E. H.: *Brit. Med. J.*, 1912, ii, 1651-54.
- 474 ———: *Proc. Roy. Soc. Lond.*, 1912, 85, B, 67-72.
- 475 Rössle, A.: *Untersuchungen über das Verhalten der Leukocytenzahl im Pferdeblut. I. Unter normalen (physiologischen) Verhältnissen*. Inaug.-Diss.; Stuttgart, 1903.
- 476 Rous, P., and Robertson, O. H.: *J. Exper. Med.*, 1917, 25, 651-73.
- 477 Rubinstein, H.: *Ztschr. f. klin. Med.*, 1901, 42, 161-85.
- 478 Rywosch, D.: *Zentralbl. f. Physiol.*, 1914, 28, 57-9.
- 479 Sabin, F. R.: *Physiol. Rev.*, 1922, 2, 38-69.
- 480 ———: *Johns Hopkins Hosp. Bull.*, 1923, 34, 277-88.
- 481 Sabrazès, J.: *Folia haematol.*, 1906, 3, 432-35.
- 482 ———, and Muratet, L.: [Quoted by Furno.]
- 483 ———, and Durroux, P.: *Compt. rend. Soc. de biol.*, 1908, 65, 169-71.
- 484 ———: *Compt. rend. Soc. de biol.*, 1908, 65, 171-73.
- 485 ———: *Gaz. hebd. méd. de Bordeaux*, 1908, 29, 339; *Also*, *Folia haematol.*, 1908, 6, 187-89.
- 486 Sahli, H.: *Klinische Untersuchungsmethoden*. Leipzig und Wien, 1909, 845.
- 487 Sahling: *Vet. Med. Diss.*, Hannover, 1920. [Rev. in *Deutsch. tierärztl. Wchnschr.*, 1920.]
- 488 Salomon, W.: *Ein Beitrag zur Morphologie des normalen Hühnerblutes*. *Vet. Med. Diss.*, Giessen, 1919.
- 489 Sappington, C. O.: *Arch. Int. Med.*, 1918, 21, 695-704.
- 490 Sattler, J.: *Folia haematol.*, 1910, 9, Arch., 216-32.
- 491 Scarpatetti, J. von: *Arch. f. mikr. Anat.*, 1891, 38, 613-18.
- 492 Schauman, O., and Rosenqvist, E.: *Ztschr. f. klin. Med.*, 1898, 35, 126-70.
- 493 Scheuermann, B.: *Klinische Untersuchungen über den Haemoglobingehalt des Blutes der Wiederkäuer*. *Vet. Med. Diss.*, Giessen, 1913.
- 494 Schifone, G.: *Incurabili*, Napoli, 1907, 22, 385-404.
- 495 ———: *Folia haematol.*, 1908, 6, 422-24.
- 496 Schilling, V.: *Folia haematol.*, 1909, 7, 225-32.
- 497 ———: *Folia haematol.*, 1914, 17, Arch., 442-46.
- 498 Schittenhelm, A., Weichardt, W., and Grisshammer, W.: *Ztschr. f. exper. Path. u. Therap.*, 1912, 10, 412-78.
- 499 Schlecht, H.: *Deutsches Arch. f. klin. Med.*, 1910, 98, 308-29.
- 500 Schmauch, G.: *Virchow's Arch. f. path. Anat.*, 1899, 156, 201-44.
- 501 Schmeisser, H. C.: *J. Exper. Med.*, 1915, 22, 820-38.
- 502 Schmidt, A.: *Über Menschenblut und Froschblut*. Ein populärer Vortrag. Dorpat, 1881.
- 503 Schmidt, C.: *Die Diagnostik verdächtiger Flecke in Criminalfällen*. Leipzig, 1848.

- 504 Schmidt, H.: Über die Möglichkeit der Unterscheidung menschlichen und thierischen Blutes in trockenen Flecken in gerichtlich-medicinischer Beziehung. Diss., Erlangen, 1878.
- 505 Schmidt, P.: Experimentelle Beiträge zur Pathologie des Blutes. Jena, 1902.
- 506 ———: München. med. Wchnschr., 1903, 50 i, 549-53.
- 507 Schridde, H.: Verhandl. d. Gesellsch. deutsch. Naturf. u. Aerzte, 1912, 83, II, 118-21.
- 508 Schroeder, E. C., and Cotton, W. E.: Bur. An. Indust. Rep., 1899, 16, 33-52.
- 509 Schtschukin, M.: [Rev. in Folia haematol., 1904, 1, 712.]
- 510 Schulhof, K.: Folia haematol., 1914, 17, Arch., 447-51.
- 511 Schultz, G.: Deutsches Arch. f. klin. Med., 1893, 51, 234-81.
- 512 Schultze, A.: Arch. f. wissensch. u. prakt. Tierheilk., 1919, 45, 123.
- 513 Schultze, F.: Beitr. z. klin. Chir., 1911, 74, 456-86.
- 514 Schürer, J.: Arch. f. exper. Path. u. Pharmakol., 1911, 66, 171-78.
- 515 Schwalbe, E., and Solley, J. B.: Virchow's Arch. f. path. Anat., 1902, 168, 399-431.
- 516 Scott, G.: J. Path. & Bact., 1901, 7, 131-36.
- 517 Scott, R. E., and French, R. W.: Mil. Surgeon, 1923, 53, 321-27.
- 518 Scriba: Untersuchungen über die Markzellen und das Blut bei einzelnen Tierarten. Inaug.-Diss.
- 519 Selinoff, A. G.: Arch. d. sci. biol., St. Petersb., 1904, 10, 273-92.
- 520 Sellards, A. W., and Baetjer, W. A.: Johns Hopkins Hosp. Bull., 1915, 26, 29-31.
- 521 Selling, L.: Beitr. z. path. Anat. u. z. allg. Path., 1911, 51, 576-631.
- 522 ———: Johns Hopkins Hosp. Monographs, 1913, 71.
- 523 Semmer: [Quoted by Bidault and by Durrourx.]
- 524 Senftleben: Monatsschr. f. prakt. Tierh., 1919, 30.
- 525 Schapiro, J.: Folia haematol., 1913, 15, Arch., 351-78.
- 526 Shaw, H. B.: J. Path. & Bact., 1903, 8, 70-81.
- 527 ———: J. Path. & Bact., 1903, 8, 435-42.
- 528 Sheaff, P. A.: J. Am. Med. Asso., 1910, 55, 2233.
- 529 Sherrington, C. S., and Copeman, S. M.: J. Physiol., 1893, 14, 52-96.
- 530 ———: Proc. Roy. Soc. Lond., 1894, 55, 161-207.
- 531 Shiguja, M.: Mitt. d. med. Gesellsch. zu Osaka, 1920, 19, 11.
- 532 Shipley, P. G.: Folia haematol., 1915-16, 20, Arch., 59-86.
- 533 Simon, P., and Spillman, L.: Compt. rend. Soc. de biol., 1906, 60, 833-35.
- 534 Simpson, M. E.: J. Med. Research, 1922, 43, 77-144.
- 535 Smith, T., and Brown, H. R.: J. Med. Research, 1906, 15, 425-47.
- 536 ———, and Kilbourne, F. L.: Bur. An. Industr., Wash., 1893, Bull. No. 1, 36-50 and appendix.
- 537 Sobkevich, A. I.: Analiz ptichyey krovī [Analysis of the blood of birds]. Tomsk, 1910.
- 538 Spiegelberg, O., and Gesheidlen, R.: Arch. f. Gynaekol., 1872, 4, 112-19.
- 539 Stäubli, C.: Deutsches Arch. f. klin. Med., 1906, 85, 286-341.
- 540 ———: Ergebn. d. inn. Med. u. Kinderh., 1910, 6, 192-220.
- 541 Steinberg, J.: Arch. f. d. ges. Physiol., 1873, 7, 101.
- 542 Stenberg: [Quoted by Corsy.]

- 543 Sternberg: [Quoted by Lütje.]
- 544 Stockman, R., and Greig, E. D. W.: *J. Physiol.*, 1898-99, 23, 376-82.
- 545 Stöltzing, W.: *Über Zählung der Blutkörperchen*. Inaug.-Diss., Marburg, 1856.
- 546 ———: [Quoted by Storch and Turowski.]
- 547 Storch, A.: *Untersuchungen über den Blutkörperchengehalt des Blutes der landwirtschaftlichen Haussäugetiere*. Inaug.-Diss., Karlsruhe, 1901.
- 548 Strassans, H., and Bellion, F.: *Am. Vet. Rev.*, 1903 and 1904.
- 549 Subbotin, V.: *Ztschr. f. Biol.*, 1871, 7, 185-96.
- 550 Sundstroem, E. S.: *Am. J. Physiol.*, 1922, 60, 443-47.
- 551 Sussdorf, M.: *Ellenberger's Handbuch der vergleichenden Physiologie der Haussäugethiere*, 1890, 2, I, 163-216.
- 552 Suzuki, T.: *Folia haematol.*, 1912, 13, Arch., 225-55.
- 553 Taddei, G.: *Folia haematol.*, 1913-14, 15, *Zentral-Organ*, 26. [Rev. from *Arch. Farm.* 14, 359-72.]
- 554 Takenouchi, M.: *Anat. Record*, 1919, 17, 45-57.
- 555 Tallqvist, T. W., and Willebrand, E. A. von: *Skandin. Arch. f. Physiol.*, 1900, 10, 37-52.
- 556 ———: *Ztschr. f. klin. Med.*, 1907, 61, 427-532.
- 557 Tamassia: *Gazz. med. lomb.*, Milano, 1894.
- 558 Tarchanoff, J., and Swaen, A.: *Arch. de physiol. norm. et path.*, 1875, 2, 324-40.
- 559 Taussig, O.: *Arch. f. exper. Path. u. Pharmakol.*, 1892, 30, 161-79.
- 560 Taylor, H. D.: *J. Exper. Med.*, 1919, 29, 97-114.
- 561 ———, Witherbee, W. D., and Murphy, J. B.: *J. Exper. Med.*, 1919, 29, 53-73.
- 562 Taylor, W. J.: *J. Am. Vet. Med. Asso.*, 1916, 49, 35-49.
- 563 Thomas, M. M., Taylor, H. D., and Witherbee, W. D.: *J. Exper. Med.*, 1919, 29, 75-82.
- 564 Thompson, W. L.: *Johns Hopkins Hosp. Bull.*, 1904, 15, 205-09.
- 565 Tietze, A.: *Dissertation*, Breslau, 1887. [Quoted by Bethe.]
- 566 Timofejewsky, D. J.: *Centralbl. f. allg. Path. u. path. Anat.*, 1895, 6, 108-19.
- 567 Topley, W. W. C.: *J. Hyg.*, 1913, 13, 191-236; *Also*, *St. Thomas' Hosp. Rep.*, Lond., 1911, 40, 195-217.
- 568 Trasbot: *Bull. Soc. centr. de méd. vét.*, 1876, 53, 344.
- 569 Treadgold, H. A.: *Lancet*, 1920, *i*, 699-705.
- 570 Trollvenier: *Rec. de méd. vét.*, 1902, 189.
- 571 Tschistowitsch, N., and Piwowarow, W.: *Arch. f. mikr. Anat.*, 1901, 57, 335-45.
- 572 Türk, W.: *Klinische Untersuchungen über das Verhalten des Blutes*. Wien u. Leipzig, 1898. [Quoted by Lütje.]
- 573 Turowski, H.: *Über das Verhalten der körperlichen Elemente zu einander im normalen Rinderblut*. Berlin, 1908.
- 574 Utendörfer: *Über das Verhältnis der Leukocyten beim Rinde mit besonderer Berücksichtigung der Tuberkulose*. Inaug.-Diss., Leipzig, 1906.
- 575 Vallée and Carré: *Compt. rend. Acad. d. sci.*, 1904, 139, 331-33.
- 576 Venzlaff, W.: *Zool. Anz.*, 1911, 38, 137-42.

- 577 ———: Arch. f. mikr. Anat., 1911, 77, 377-432.
- 578 Viault, F.: Compt. rend. Acad. d. sci., 1890, 111, 917-18.
- 579 Vierordt, K.: Arch. f. physiol. Heilk., 1852, 11. [Quoted by Turowski.]
- 580 ———: Arch. f. physiol. Heilk., 1854, 262. [Quoted by Storch.]
- 581 Virchow, R.: Zellulärpathologie. Berlin, 1871, 1, 178. [Quoted by Lütje.]
- 582 Vogel, K. M., and McCurdy, U. F.: Arch. Int. Med., 1913, 12, 707-22.
- 583 Van Slyke, D. D.: J. Biol. Chem., 1918, 33, 127-32.
- 584 Voss, G. von: Deutsches Arch. f. klin. Med., 1897, 58, 489-522.
- 585 Walker: [Quoted by Corsy.]
- 586 Wallgren, A.: Folia haematol., 1909, 8, 307-24.
- 587 Walther, A.: Arch. f. d. ges. Physiol., 1908, 123, 233-48.
- 588 ———: Beiträge zur Kenntnis von Blutplättchen und Blutgerinnung unter besonderer Berücksichtigung des Pferdes. Jena, 1910; *Also*, Ztschr. f. Tiermed., 1910, 14, 161-221.
- 589 Ward, A. R.: Univ. Calif. Agr. Exper. Sta., 1904, Bull. 156.
- 590 Ward, H. C.: Am. J. Physiol., 1904, 11, 394-403.
- 591 Warthin, A. S.: J. Med. Research, 1902, 7, 435-63.
- 592 ———: J. Infect. Dis., 1907, 4, 369-381.
- 593 ———: Contrib. to Med. Research, Ann Arbor, 1903, 216.
- 594 Webb, Gilbert, and Havens: Tr. Nat. Tuberc. Ass., 1914, 10, 180.
- 595 ———, Williams, W. W., and Basinger, A. F.: Tr. Nat. Tuberc. Ass., 1910, 6, 279-307.
- 596 Weidenreich, F.: Folia haematol., 1905, 2, 95-163.
- 597 ———: Arch. f. mikr. Anat., 1908, 72, 209-325.
- 598 ———: Die Leukocyten und verwandte Zellformen, Morphologie und allgemeine Lebenserscheinungen der farblosen Blutkörperchen, Lymph- und Wanderzellen der Wirbeltiere, nebst der Technik ihrer histologischen Darstellung. Wiesbaden, 1911.
- 599 Weiser: Wien. tierärztl. Monatsschr., 1922, 9, 153.
- 600 Welcker, H.: Prag. Vrtljschr., 1854, 44, 11; *Also*, Ztschr. f. rat. Med., 1858, 4, 145.
- 601 ———: Ztschr. f. rat. Med., 1863, 20.
- 602 ———: Arch. f. mikr. Anat., 1872, 8, 472-80.
- 603 Wellendorf: [Quoted by Corsy.]
- 604 Wells, C. W.: J. Infect. Dis., 1917, 20, 219-31.
- 605 Wells, J. J., and Sutton, J. E.: Am. J. Physiol., 1915, 39, 31-6.
- 606 Wendelstadt, H., and Bleibtreu, L.: Arch. f. d. ges. Physiol., 1892, 52, 323-56.
- 607 Wetzl, J.: Ztschr. f. Tiermed., 1910, 14, 1-47.
- 608 Whipple, G. H., and Hooper, C. W.: Am. J. Physiol., 1916, 40, 349-59.
- 609 ———: Am. J. Physiol., 1917, 42, 256-263.
- 610 ———, and Robscheit, F. S.: Am. J. Physiol., 1920, 53, 263-82.
- 611 ———, and Robscheit, F. S.: Arch. Int. Med., 1921, 27, 591-603.
- 612 Wiendieck, K.: Untersuchungen über das Verhalten der Blutkörperchen bei gesunden und bei mit kruppöser Pneumonie behafteten Pferden. Inaug.-Diss., Leipzig, 1906; *Also*, Arch. f. wissenschaft. u. prakt. Tierh., 1906, 32, 113-69.

- 613 Wilhelm: Saechs. vet. Ber., 1901, 44.
614 Williamson, C. S.: Arch. Int. Med., 1916, 18, 505-28.
615 Wolferth, C. C.: Arch. Int. Med., 1917, 19, 105-16.
616 Wolff: Berl. Thierärztl. Wchnschr. [Quoted.]
617 Woltmann, H.: J. Exper. Med., 1905, 7, 119-62.
618 Wood, F. C.: Chemical and microscopical diagnosis. New York and London, 1912.
619 Worm-Müller: Transfusion and plethora. Christiana, 1875.
620 Wright, J. H., and Kinnicutt, R.: J. Am. Med. Asso., 1911, 56, 1457-59.
621 Wundram, G.: [Quoted by Lenze.]
622 Yakimoff, V. L.: Arch. vet. nauk., St. Petersburg., 1910, 40, 219-36.
623 ———, and Kol, N.: Arch. vet. nauk., St. Petersburg., 1907, 37, 563-89.
624 Zenoni, C.: Beitr. z. path. Anat. u. z. allg. Path., 1894, 16, 537-51.
625 Ziegler, K.: Experimentelle und klinische Untersuchungen über die Histogenese der myeloiden Leukaemia. Jena, 1906.
626 ———: Path. Anat. Arb. Joh. Orth z. Prof.-Jubil., Berlin, 1903, 299-317.
627 Zietschmann, O.: Internat. Monatsschr. f. Anat. u. Physiol., 1905, 22, 1-89.
628 Zinsser, H., and Tsen, E.: J. Immunol., 1917, 2, 247-68.
629 Zuill, W. L.: Friedberger & Frohner's Pathology and Therapeutics of the Domestic Animals. Phila., 1895. [Transl. by W. L. Zuill.]