PHOTO BY E. H. SANBORN.

THE FALLS IN WINTER.

View from northeast, showing new dam and fall, with Lake Agassiz's increased area.

SIXTH ANNUAL REPORT

OF THE

NEW YORK ZOOLOGICAL SOCIETY

CHARTERED IN 1895

OBJECTS OF THE SOCIETY

A PUBLIC ZOOLOGICAL PARK

THE PRESERVATION OF OUR NATIVE ANIMALS

THE PROMOTION OF ZOOLOGY

1901

NEW YORK

OFFICE OF THE SOCIETY, 11 WALL STREET

APRIL 1, 1902

TROW DIRECTORY
PRINTING AND BOOKBINDING COMPANY
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Crane, Albert.....35 Wall Street
Cranford, J. P.....Wakefield, New York City
Cranford, Ralph N.....Wakefield, New York City
Crawford, Francis.....24 East 42d Street
Crawford, Dr. W. H.....205 West 57th Street
Cromwell, James W.....1 Greene Street
Crosby, Livingston.....Riverdale-on-Hudson
Cruickshank, James.....275 Central Park West
Cutter, Ralph L.....219 Clinton Street, Brooklyn
Cutting, R. Fulton..... 32 Nassau Street
Cutting, W. Bayard.....24 East 72d Street
Daniels, George H.....Grand Central Depot
Danne, Dr. Frederic.....44 West 50th Street
Dards, Charles A.....536 Fifth Avenue
Davies, William Gilbert.....32 Nassau Street
Davis, Gherardi.....44 Pine Street
Davis, John W. A.....21 West 14th Street
Davison, Charles Stewart.....56 Wall Street
Davison, G. Howard.....51 East 49th Street
Day, Amasa T.....5 East 19th Street
*Day, Henry Mills.
De Coppet, Henry.....22 West 17th Street
Deeves, Richard.....58 West 83d Street
De Forest, George B.....14 East 50th Street
De Forest, Robert W.....7 Washington Square North
Degener, J. F.....5 West 38th Street
De Klyn, B. F.....54 West 30th Street
Delafield, Frederick P.....29 Liberty Street
Deming, Dr. W. C.....Westchester, N. Y.
Denicke, J. B.....1041 Woodruff Street
Denslow, Harry.....American Museum Natural History
De Peyster, Johnston L.....Tivoli, N. Y.
Derby, Dr. Richard H.....9 West 35th Street
De Rham, H. Casimir.....Tuxedo, N. Y.
Devereux, W. B.....98 John Street
De Vinne, Theodore Low.....300 West 76th Street

* Deceased.

De Witt, Walter G.....201 East 12th Street
De Witt, William G.....10 West 30th Street
Dexter, Stanley W.....71 Broadway
Deyo, Robert E.....106 West 48th Street
Dickerman, George W.....316 Broadway
Dickey, Charles D.....59 Wall Street
Diehl, George H.....18 West 127th Street
Dienst, A. P.....Third Avenue and 140th Street
Ditmars, R. L.....New York Zoological Park
Dodge, Norman W.....81 New Street
Dominick, H. Blanchard.....14 West 49th Street
Dommerich, L. F.....57 Greene Street
Dormitzer, Mrs. Henry D.....27 East 74th Street
*Dorr, Robert E. A.
Doubleday, F. N.....34 Union Square East
Douglas, James.....99 John Street
Dows, Tracy.....8 Broadway
Drake, John J.....58 William Street
Drakenfeld, B. Ferdinand.....27 Park Place
Draz, F.....36 East 57th Street
Duane, Richard Bache.....10 East 58th Street
Duer, William A.....115 Broadway
Duncan, A. Butler.....1 Fifth Avenue
Duncan, Stuart.....392 Canal Street
Dunham, Edward K.....338 East 26th Street
Dunham, G. H.....19 West 81st Street
*Dunham, James H.
Dunham, Lawrence.....7 East 42d Street
*Dunlap, Robert.
Dunn, Isaac L.....680 East 175th Street
Dunne, Edward B.....54 West 30th Street
Dunne, James.....31 Nassau Street
Duryea, Harry H.....80 Madison Avenue
Duryea, Gen. Hiram.....80 Madison Avenue
Dutcher, William..... 525 Manhattan Avenue
Edgar, D.....Noroton, Conn.
Edgar, Miss Julia L.....28 East 39th Street
Edgar, Newbold.....28 East 39th Street
Edgar, Herman L. R.....31 Nassau Street
Edgell, George S.....192 Broadway
Edmonds, John W.....128 East 44th Street
Egerton, M.....9 Seamore Place, May Fair, London, England
Egleston, D. S.....166 South Street
Ehlers, Otto.....1901 Washington Avenue
Eidlitz, Robert James.....995 Madison Avenue
Elder, Mrs. Matilda A.....25 East 30th Street
Eldridge, Roswell.....Great Neck, N. Y.

* Deceased.

ELLSWORTH, DUNCAN S.....Calumet Club
ELLSWORTH, JOHN MAGEE.....Calumet Club
ELLSWORTH, WILLIAM.....16 Lafayette Avenue, Brooklyn, N. Y.
EMERY, JOHN J.....5 East 68th Street
EMMET, MISS L. F.....New Rochelle, N. Y.
EMMET, ROBERT TEMPLE.....New Rochelle, N. Y.
EMMET, W. L. R.....Schenectady, N. Y.
ENDEMANN, WILLIAM.....1263 Franklin Avenue
ENDICOTT, ROBERT.....110 East 19th Street
ENO, JOHN CHESTER.....P. O. Box 1889
ETTLINGER, LOUIS.....40 East 73d Street
EVANS, MRS. CADWALADER.....12 East 11th Street
EVANS, RICHARD.....92 William Street
EVARTS, A. W.....52 Wall Street
EVARTS, SHERMAN.....52 Wall Street
FAAS, JOHN.....1351 Washington Avenue
FABBRI, ALLESANDRO.....Scarborough, N. Y.
FABBRI, ERNESTO G.....Scarborough, N. Y.
FAHNESTOCK, HARRIS C.....2 Wall Street
FAIRCHILD, NELSON.....39 East 31st Street
FALK, GUSTAV.....24 East 81st Street
FARGO, JAMES C.....56 Park Avenue
FARNHAM, PAULDING.....15 Union Square
FISHER, L. G.....42 New Street
FITCH, EZRA H.....2 West 88th Street
FITZGERALD, GEN. LOUIS.....253 Lexington Avenue
FLINT, THOMPSON J. S.....Larchmont, N. Y.
FOSTER, EDWARD W.....Hotel Bristol
FOSTER, GIRAUD.....18 Wall Street
FOSTER, M. G.....876 St. Nicholas Avenue
FOSTER, PELL W.....126 Liberty Street
FOSTER, SCOTT.....395 Canal Street
FOWLER, OTIS L. R.....1263 East 179th Street
FOX, JOHN J.....1908 Bathgate Avenue
FRANKFIELD, MRS. A.....328 West 56th Street
FRASER, ALEX V.....478 Greenwich Street
FULDA, CARL.....107 Kent Street, Brooklyn
FULDA, DR. CLEMENS.....107 Kent Street, Brooklyn
FULLER, CHARLES D.....25 West 9th Street
GANNON, BARTHOLOMEW.....1628 Second Avenue
GANZ, ANTHONY.....2146 Boston Road
GARRETT, JOHN W.....11 South Street, Baltimore, Md.
GAY, JOSEPH E.....Union League Club
GERRISH, JOHN BROWN.....21 Thomas Street
GERSTER, DR. ARPAD G.....34 East 75th Street
GHEE, THOMAS.....Eastchester Road, Williamsbridge, N. Y.
GIBNEY, DR. VIRGIL P.....16 Park Avenue
GILBERT, CLINTON.....48 East 50th Street

GILL, GEORGE.....164 South Fourth Avenue, Mount Vernon, N. Y.
GILMAN, THEODORE.....311 Palisade Avenue, Yonkers
GILSEY, HENRY, JR.....10 East 36th Street
GLEESON, JOSEPH M.....45 East 59th Street
GODDARD, F. N.....273 Lexington Avenue
GOLDSCHMIDT, S. A.....71 Central Park West
GOOD, MARTIN Q.....233 East 87th Street
GOODHUE, MRS. C. C.....189 Madison Avenue
*GOODRIDGE, MRS. FREDERIC.
GOODWIN, REV. FRANCIS.....Hartford, Conn.
GOTTHOLD, FREDERIC.....165 West 58th Street
GOULD, CHARLES A.....25 West 33d Street
GOULD, C. W.....5 Washington Square
GOULD, EDWIN.....195 Broadway
GOULDEN, JOSEPH A.....2433 Creston Avenue, Fordham
GRACE, WILLIAM R.....P. O. Box 2866, New York City
GRANT, R. S.....Union Club
GRAVES, ANDREW B.....Calumet Club
GRAY, J. H.....313 West 77th Street
GREENE, GEN. FRANCIS V.....11 Broadway
GREENOUGH, JOHN.....31 West 35th Street
GREENWOOD, ISAAC J.....271 West End Avenue
GREER, CHARLES.....Rye, N. Y.
GRIFFITH, DANIEL J.....21 West 56th Street
GRINNELL, GEORGE BIRD.....346 Broadway
GRINNELL, WILLIAM MORTON.....873 Madison Avenue
*GRISWOLD, CHESTER.
GROSSMAN, GEORGE J.....952 Trinity Avenue
GULLIVER, W. C.....120 Broadway
GURNEE, W. S., JR.....20 Gramercy Park
HADDEN, DR. ALEXANDER.....155 East 51st Street
HALSTEAD, MISS L. P.....110 East 37th Street
HAMERSLEY, MASTER LEWIS GORDON.....1030 Fifth Avenue
HAMILTON, THEODORE.....1028 Grote Street
HAMMOND, MRS. JOHN HENRY.....14 East 72d Street
HANSON, H. D.....310 East 21st Street
HARD, ANSON W.....107 Wall Street
HARBECK, CHARLES T.....Islip, N. Y.
HARRIMAN, W. M.....120 Broadway
HART, WILLIAM W.....47 East 12th Street
HARTOG, FERDINAND J., JR.....21 East 99th Street
HARVEY, ALEXANDER.....Union Club
*HASBROUCK, PRICE W.
HASBROUCK, HAROLD.....39 West 90th Street
HASSLACHER, JACOB.....100 William Street
HATFIELD, THOMAS F.....834 Hudson Street, Hoboken, N. J.
HAVEMEYER, T. A.....117 Wall Street

* Deceased.

HAVENS, ALBERT G.....East Orange, N. J.
HAWLEY, E.....349 Broadway
*HAYDEN, HORACE J.
HAYNES, WILLIAM DE FOREST.....16 East 36th Street
HECKSCHER, JOHN GERARD.....31 West 75th Street
HEIMAN, ABRAHAM.....745 East 175th Street
HEIMAN, E.....745 East 175th Street
HEINS, GEORGE L.....303 State Street, Albany
HEINSHEIMER, L. A.....27 Pine Street
HEINTZ, JOHN C.....169th Street and Third Avenue
HIETEMEYER, CLEMENS.....810 Hudson Street, Hoboken, N. J.
*HENDRICKS, CLIFFORD B.
HENRIQUES, DR. H. A.....Morristown, N. J.
HERMANN, FERDINAND.....P. O. Box 477
HERTER, CHRISTIAN A.....819 Madison Avenue
HERZFELD, FELIX.....147 West 86th Street
HESS, SELMAR.....956 Madison Avenue
HILL, E. B.....11 Sumner Street, Quincy, Mass.
HILYARD, GEORGE D.....144 East 49th Street
HINTON, DR. JOHN H.....41 West 32d Street
HITCHCOCK, CENTER.....Knickerbocker Club
HOE, RICHARD M.....11 East 71st Street
HOE, MRS. RICHARD M.....11 East 71st Street
HOE, MRS. ROBERT.....11 East 36th Street
HOLBROOK, MRS. F. S.....Stamford, Conn.
HOLBROOK, MISS LILIAN.....Stamford, Conn.
HOLDEN, GEORGE A.....185 Riverside Drive
HOLLAND, HEDLEY L.....2244 Bathgate Avenue, New York
HOLST, L. J. R.....1410 President Street, Brooklyn, N. Y.
HOLT, HENRY.....29 West 23d Street
HOMER, WALLACE.....Garrison, N. Y.
HOPPIN, HAMILTON L.....47 West 11th Street
HORTON, G. B.....83 Gold Street
HOSKIER, H. C.....26 Exchange Place
HOTCHKISS, HORACE L.....35 Broad Street
HOWLAND, G. G.....New York Herald
HOWLAND, HENRY E.....35 Wall Street
HOYT, ALFRED M.....1 Broadway
HOYT, COLGATE.....36 Wall Street
HOYT, GEORGE S.....72 Gold Street
*HOYT, JESSE.
HUNTINGTON, REV. W. R.....804 Broadway
HUTCHINS, AUGUSTUS SCHELL.....69 Wall Street
HUMPHREYS, MRS. EDWARD WALSH.....32 East 38th Street
HYDE, B. T. BABBITT.....20 West 53d Street
HYDE, CLARENCE M.....80 Broadway
HYDE, DR. FREDERICK E.....20 West 53d Street

* Deceased.

INNESS, GEORGE, JR.....145 West 58th Street
ISELIN, ADRIAN, JR.....9 East 26th Street
ISHAM, CHARLES H.....30 East 63d Street
ISHAM, MISS JULIA B.....5 East 61st Street
ISHAM, SAMUEL.....5 East 61st Street
JACKSON, FREDERIC WENDELL.....Westchester, New York City
JACKSON, DR. GEORGE THOMAS.....692 West End Avenue
JACKSON, SAMUEL MACAULEY.....692 West End Avenue
JACKSON, THEODORE F.....10 West 43d Street
JACOB, LAWRENCE.....42 East 49th Street
JACOBI, DR. A.....19 East 47th Street
JACQUELIN, HERBERT T. B.....34 East 38th Street
JACQUELIN, JOHN H.....34 East 38th Street
JAMES, ARTHUR CURTISS.....99 John Street
JAMES, DR. WALTER B.....17 West 54th Street
JENNINGS, F. B.....86 Park Avenue
JENNINGS, PHILANDER R.....190 Water Street
JENNINGS, WALTER.....26 Broadway
JESUP, CHARLES M.....124 East 36th Street
JESUP, JAMES R.....555 Fifth Avenue
JOHNSON, F. COIT.....110 Worth Street
JOHNSON, DAVID S.....72 East 127th Street
JOLINE, ADRIAN HOFFMAN.....1 West 72d Street
JONES, MRS. JOSEPHINE K.....Fifth Avenue Hotel
JONES, LEWIS Q.....Bay View, Newport, R. I.
KAHN, LOUIS.....192 Broadway
KAHN, MOSES.....192 Broadway
KANE, JOHN INNES.....49 West 23d Street
KANE, S. NICHOLSON.....23 West 47th Street
KEECH, FRANK B.....14 East 65th Street
KELLER, ERNEST F.....Mt. Hope, Tremont, New York City
KELLEY, AUSTIN P.....37 Wall Street
KELLY, EUGENE.....763 Fifth Avenue
KEMP, ARTHUR T.....615 Fifth Avenue
KENT, EDWIN C.....66 Maiden Lane
KERSTING, RUDOLF.....104 Fulton Street
KEUFFEL, WILHELM.....510 Hudson Street, Hoboken, N. J.
KIDDER, JAMES HATHAWAY.....Union Club, Boston, Mass.
KIMBALL, ALFRED R.....15 Wall Street
KING, RUPERT COCHRANE.....27 Waverley Place
KING, WILLIAM F.....871 Madison Avenue
KING, WILLIAM W.....N. & S. R. R., Norfolk, Va.
KNAPP, DR. HERMAN.....26 West 40th Street
KNAPP, JOHN M.....66 Broadway
KNIGHT, CHARLES R.....American Museum of Natural History
KNOEDLER, ROLAND F.....122 West 13th Street
KNOX, JAMES W.....2032 Bathgate Avenue
KOHLMAN, CHARLES.....236 Church Street

KUHN, GEORGE J.....4400 Park Avenue
KUHNE, PERCIVAL.....7 East 78th Street
KUNHARDT, HENRY R.....124 West 74th Street
KUTTROFF, ADOLF.....17 East 69th Street
LAGAI, DR. GEORGE.....17 Park Place
LA FARGE, OLIVER H. B..Second Avenue and Cherry Street, Seattle, Wash.
LAMBERT, DR. ALEXANDER.....125 East 36th Street
LANDON, FRANCIS G.....27 William Street
LANE, EDWARD V. Z.....143 Liberty Street
LANE, JAMES WARREN.....4 East 61st Street
LANGE, J. D.....220 West 79th Street
LANGLOTH, J.....784 Fifth Avenue
LAPSLEY, DAVID.....44 West 33d Street
LAUDAUER, I. N.....37 East 76th Street
LAWRENCE, JOHN BURLING.....126 East 30th Street
LAWRENCE, NEWBOLD T.....51 Liberty Street
LAWRENCE, W. V .....969 Fifth Avenue
LAYNG, J. D.....931 Fifth Avenue
LEDOUX, ALBERT R.....39 West 50th Street
LEE, AMBROSE.....Williamsbridge, N. Y.
LEE, PROFESSOR FRED. S.....64 Park Avenue
LEE, MRS. FREDERICK S.....64 Park Avenue
LEE, J. BOWERS.....19 William Street
LEFFERTS, MARSHALL C.....34 East 65th Street
LE GENDRE, WILLIAM C.....59 Wall Street
LESHER, A. L.....9 East 75th Street
LETKEMANN, H. L.....1278 Fulton Avenue
LEVY, S. H.....192 Broadway
LEWIS, FREDERIC ELLIOTT.....22 West 38th Street
LEWIS, PERCY PYNE.....5 Vanderbilt Avenue
LEWISOHN, ADOLPH.....11 Broadway
*LEWISOHN, LEONARD.
LIEBENAU, ALBERT, JR.....3492 Park Avenue
LIPPMANN, DANIEL J.....1974 Bathgate Avenue
LITCHFIELD, EDWARD H.....59 Wall Street
LIVINGSTON, WILLIAM S.....207 Berry Street, Brooklyn
LIVINGSTON, T. G.....Boston Road, Bronxdale, N. Y.
LOBENSTINE, WILLIAM CHRISTIAN.....245 Central Park West
LOCKWOOD, WILLISTON B.....205 West 57th Street
LOEBER, CHARLES.....Bedford Park, N. Y.
LOGAN, WALTER S.....206 West 72d Street
LONGFELLOW, MRS. FREDERICK W.....Riverdale-on-Hudson
LORING, J. ALDEN.....Owego, N. Y.
LUDEWIG, CHARLES H.....996 Tremont Avenue
LUSK, PROF. GRAHAM.....11 East 74th Street
LUTTGEN, WALTHER.....P. O. Box 1587, New York City
LYMAN, FRANK.....34 Remsen Street, Brooklyn

* Deceased.

McAlan, John.....4 West 84th Street
McAllister, Alexander.....21 Fulton Street
McAlpin, Charles W.....11 East 90th Street
McAlpin, Mrs. Charles W.....11 East 90th Street
McAlpin, George L.....9 East 90th Street
McCabe, Charles F.....Fordham, N. Y.
McCall, John A.....346 Broadway
McClure, S. S.....141 East 25th Street
McCurdy, Richard A.....32 Liberty Street
McKay, Thomas.....460 East 10th Street
McKim, Rev. Haslett.....9 West 48th Street
McLaughlin, A. P.....1028 Grote Street
McLean, James.....16 West 55th Street
McVickar, Edward.....267 Fifth Avenue
Mace, Arthur J.....Williamsbridge, N. Y.
Mackay, George D.....20 West 69th Street
Magee, John.....Corning, N. Y.
Mali, Pierre.....8 Fifth Avenue
Mapes, Daniel, Jr.....1920 West Farms Road
Mapes, Ernest S.....1279 Woodruff Street, West Farms
Marlor, Henry S.....Brooklyn, Conn.
Marsh, C. P.....Country Club, Westchester, New York City
Marshall, Louis.....33 East 72d Street
Martin, George C.....106 West 61st Street
Marston, Edward S.....22 William Street
Martin, F. E.....29 Pine Street
Marx, George B.....340 East 118th Street
Maslen, Richard R.....217 West 125th Street
Matthews, John H.....90th Street and Riverside Drive
Maxwell, Robert.....64 Worth Street
Mayer, Alfred G..Museum of B'klyn Institute, Eastern Parkway, B'klyn
Mead, Walter H.....222 West 23d Street
Mehl, Henry.....128 Webster Avenue, Jersey City, N. J.
Merkel, Hermann W.....Zoological Park
Meyer, Hermann N.....4532 Park Avenue
Meyrowitz, Emil B.....104 East 23d Street
Middlebrook, Frederick.....Grand Central Station
Miles, John.....610–614 Broadway
Miller, Edward F.....712 Tremont Avenue
Miller, William R.....Southern Boulevard and 187th Street
Mills, Abraham G.....71 Broadway
Mills, W. McMaster.....65 East 55th Street
Mitchell, H. Raymond.....1805 Crotona Avenue
Monson, A. C.....40 Wall Street
Montant, Alphonse.....326 West 22d Street
Montgomery, Richard M.....19 West 34th Street
Moore, Charles Arthur, Jr.....Yale University, New Haven, Conn.
Moore, Francis C.....80 Madison Avenue

MORGAN, MISS ANNIE T.....219 Madison Avenue
MORGAN, EDWIN D.....100 Broadway
MORGAN, GEORGE H.....6 East 40th Street
MORGAN, J. P., JR.....J. S. Morgan & Co., London, England
MORGAN, JUNIUS S.....Princeton, N. J.
MORGAN, MRS. JUNIUS S.....Princeton, N. J.
MORRIS, DAVE H.....Westchester, New York City
MORRIS, FORDHAM.....16 Exchange Place
MORRIS, DR. LEWIS R.....60 West 58th Street
MOTT, JORDAN L., JR.....17 East 47th Street
MUELLER, CHARLES F.....1815 Prospect Avenue
MULCAHY, H. T.....704 East 169th Street
MUNN, HENRY NORCROSS.....Orange, N. J.
MUNROE, HENRY W.....31 Nassau Street
MURGATROYD, JOHN.....128 St. James Place, Brooklyn
MURTHA, JAMES J.....339 Alexander Avenue
NEILSON, DR. HOWARD S.....63 West 64th Street
NICHOLS, ACOSTA.....27 Pine Street
NICHOLS, GEORGE L.....66 East 56th Street
NILES, J. BARRON.....7 Wall Street
NILES, ROBERT L.....20 Broad Street
NOBLE, H. G. S.....52 Broadway
NOTMAN, JOHN.....54 Wall Street
OAKLEY, H. CRUGER.....52 Broadway
OGDEN, M. C.....98 Chambers Street
OLSEN, CHARLES P.....2796 Pond Place
OLYPHANT, ROBERT.....21 Cortlandt Street
OLYPHANT, R. M.....21 Cortlandt Street
ONATIVIA, J. VICTOR.....16 East 82d Street
*O'NEILL, HUGH.
OSBORN, MRS. HENRY F.....850 Madison Avenue
OSTRANDER, MISS MARY M.....50 West 53d Street
OUTERBRIDGE, DR. PAUL.....52 West 53d Street
OVENS, JAMES.....770 Tremont Avenue
OWEN, MISS JULIETTE A.....306 North 9th Street, St. Joseph, Mo.
*OWEN, MRS. THOMAS JEFFERSON.
PALMER, FRANCIS F.....742 East 12th Street
PALMER, NICHOLAS F.....922 Fifth Avenue
PALMER, S. S.....52 Wall Street
PANCOAST, RICHARD.....28 Platt Street
PARKER, FRANCIS EYRE.....160 West 59th Street
PARSONS, EDWIN.....515 Madison Avenue
PARSONS, MRS. EDWIN.....326 West 90th Street
PARSONS, JOHN E.....30 East 36th Street
PARSONS, H. DE B.....22 William Street
PARSONS, WILLIAM BARCLAY.....320 Broadway
PARSONS, WILLIAM BARCLAY, JR.....51 East 53d Street

* Deceased.

PARSONS, WILLIAM H.....Rye, N. Y.
PATERSON, R. W.....2 West 51st Street
PATTERSON, W. H.....275 Fifth Avenue
PAUL, W. A. O.....Hotel Margaret, Brooklyn
*PEABODY, A. J.
PEABODY, ROYAL C.....11 Broadway
PECK, THEODORE G.....Haverstraw, N. Y.
PEEK, HENRY T.....1820 Monroe Avenue
*PELL, ALFRED.
PELL, MRS. ALFRED.....Highland Falls, N. Y.
PELL, STEPHEN H. P.....99 John Street
PELTON, FRANKLIN D.....Calumet Club
PENDLETON, FRANCIS KEY.....7 East 86th Street
PENFOLD, WILLIAM HALL.....10 East 40th Street
PENNIMAN, GEORGE H.....1071 Fifth Avenue
PERKINS, ROBERT P.....3 West 16th Street
PETERS, CHARLES G.....38 East 50th Street
PETERS, SAMUEL T.....117 East 37th Street
PETERS, W. R.....23 West 73d Street
PHYFE, W. H. P.....12 East 43d Street
PICKHARDT, CARL.....1042 Madison Avenue
PIEL, GOTTFRIED.....Liberty and Sheffield Avenues, Brooklyn
PIERSON, GEN. J. FRED.....29 Broadway
PINCHOT, GIFFORD.....Department of Agriculture, Washington, D. C.
PLYMPTON, GILBERT M.....30 West 52d Street
POLLOCK, GEORGE E.....28 West 21st Street
*POND, A. EDWARD.
PORTER, CLARENCE.....213 West 70th Street
PORTER, H. H.....120 Broadway
PORTER, WILLIAM L.....P. O. Box 573, Waterford, N. Y.
POST, ABRAM S.....81 Fulton Street
POST, EDWARD C.....350 West End Avenue
POST, GEORGE B., JR.....Mills Building
POSTLEY, CLARENCE A.....817 Fifth Avenue
POTTER, MISS BLANCHE.....33 East 38th Street
POTTER, E. C.....36 Wall Street
POTTER, FREDERICK.....71 Broadway
POTTER, MISS MARTHA.....33 East 38th Street
POTTS, WILLIAM BREVOORT.....39 East 39th Street
PRATT, DALLAS B.....24 West 48th Street
PRENTISS, GEORGE LEWIS.....University Club
PRINCE, EDWARD S.....2055 Bathgate Avenue
PRINCE, PROF. J. DYNELEY.....University Heights
PRYER, CHARLES.....New Rochelle, N. Y.
PUTNAM, WILLIAM A.....2 Wall Street
PYLE, JAMES TOLMAN.....673 Fifth Avenue
PYNE, M. TAYLOR.....52 Wall Street

* Deceased.

RAND, GEORGE C.....Lawrence, L. I.
RANDOLPH, L. V. F.....49 Wall Street
RANDOLPH, WILLIAM W.....31 Nassau Street
RATHBORNE, RICHARD C.....care Spratts Patent (Ltd.), Newark, N. J.
RAUCH, WILLIAM.....Union Club
READ, WILLIAM A.....4 East 62d Street
REDMOND, HENRY S.....41 Wall Street
REDMOND, GOOLD H.....6 North Washington Square
REINHARDT, GEORGE N.....1346 Franklin Avenue
REYNOLDS, JAMES BRONSON.....184 Eldridge Street
RHINELANDER, CHARLES E.....6 West 32d Street
RHOADES, JOHN HARSEN.....559 Madison Avenue
RICHARD, AUGUSTE.....12 East 69th Street
RICHARDS, E. O.....105 East 19th Street
RIKER, JOHN L.....19 West 57th Street
RIKER, SAMUEL.....27 East 69th Street
RIPLEY, H. DILLON.....Racquet Club
RIPLEY, SIDNEY DILLON.....Hempstead, L. I.
RIVES, GEORGE L.....32 Nassau Street
ROBBINS, CHANDLER.....64 West 47th Street
*ROBBINS, S. HOWLAND.
ROBISON, WILLIAM.....18 Wall Street
ROCKEFELLER, WILLIAM.....26 Broadway
ROELKER, ALFRED.....53 West 47th Street
ROGGENKAMP, AUGUST.....567 East 176th Street
ROGERS, E. L.....71 Broadway
ROGERS, JAMES H.....881 St. Nicholas Avenue
ROKENBAUGH, HENRY S.....504 Fifth Avenue
ROLLE, AUGUST J.....College Point, L. I.
ROOT, ELIHU.....1626 Rhode Island Avenue, Washington, D. C.
ROPES, ALBERT G.....17 State Street
ROSE, JOHN J.....Jerome Street, Williamsbridge, N. Y.
ROSS, P. SANFORD.....29 Maiden Lane
ROTH, F. R. G.....381 Mountain Road, West Hoboken, N. J.
ROWLEY, JOHN.....American Museum of Natural History
RUNGIUS, CARL.....107 Kent Street, Brooklyn
RUNYON, CHARLES.....25 Fifth Avenue
RUPPERT, JACOB.....1116 Fifth Avenue
RUSS, EDWARD.....P. O. Box 316, Hoboken, N. J.
RUSS, WILLIAM V.....209 North 6th Street, Roseville, Newark, N. J.
RUSSELL, ROBERT HOWARD.....Union Club
RYAN, J. D.....825 Third Avenue
RYNIKER, DR. HENRY J.....219 East 12th Street
SACKETT, MISS.....196 Madison Avenue
SACKETT, CLARENCE.....196 Madison Avenue
SACKETT, MRS. S. E .....196 Madison Avenue

* Deceased.

SAGE, DEAN.....Albany, N. Y.
SAGE, JOHN H.....Portland, Conn.
SALTUS, LLOYD.....Hamilton Club, Brooklyn, N. Y.
SAMPSON, ALDEN.....Haverford, Pa.
SAUTER, FREDERICK.....3 North William Street
SCHARMANN, H. B.....170 West 59th Street
SCHEFER, CARL.....40 West 37th Street
SCHIEFFELIN, WILLIAM J.....170 William Street
SCHILLING, R. F.....28 Cooper Square
SCHIRMER, RUDOLPH E.....243 East 17th Street
SCHLATTER, CHAS. F.....129 West 120th Street
SCHMIDT, GEORGE.....341 West 56th Street
SCHNEIDER, G. E.....961 East 184th Street
SCHRANK, GEORGE.....183d Street and Jackson Avenue
SCHULTZE, JOHN S.....59 Wall Street
SCHUMACHER, C.....31 East 81st Street
SCHUYLER, MISS LOUISA LEE.....135 East 21st Street
SCHWAB, MRS. GUSTAV.....Morris Heights
SEARS, ROBERT B.....7 Taulmier Place, Jersey City
SEIB, H.....85 West 118th Street
SEITZ, ARTHUR.....811 Hudson Street, Hoboken, N. J.
SELIGMAN, ALFRED L.....Mills Building
SHAPIRO, D.....4175 Third Avenue
SHAW, CHARLES HERBERT.....47 West 43d Street
SHAW, JAMES G.....130 William Street
SHAW, WALTER W.....515 Madison Avenue
SHELDON, GEORGE R.....24 East 38th Street
SHELDON, MRS. ISAAC E.....46 East 82d Street
SHELDON, W. C.....95 Park Avenue
SHERMAN, GARDINER.....Metropolitan Club
SHIPWAY, JOHN H.....2972 Hull Avenue, Bedford Park
SHRADY, HENRY M.....305 West 80th Street
SHURTLEFF, R. M.....44 West 22d Street
SIEGEL, JACOB.....169th Street and Third Avenue
SIMMONS, JOSEPH F.....201 East 12th Street
SIMONS, JAMES D.....44 Broad Street
SIMPSON, JOHN BOULTON, JR.....97 Fifth Avenue
SKIDMORE, SAMUEL TREDWELL.....71 West 50th Street
SKIDMORE, WILLIAM L.....39 West 52d Street
SMILEY, DANIEL.....Mohonk, N. Y.
SMILLIE, CHARLES F.....50 Wall Street
*SMITH, DR. EDWARD A.
SMITH, F. M.....101 Sansome Street, San Francisco, Cal.
SMITH, FRANK SULLIVAN.....54 Wall Street
SMITH, GEORGE WARREN.....Metropolitan Club
SMITH, LUCIUS H.....19 East 34th Street

* Deceased.

SMITH, PHILIP S.....46 Johnson Park, Buffalo, N. Y.
SMITH, ROBERT W.....201 East 12th Street
SMITH, WILLIAM ALEXANDER.....412 Madison Avenue
SMITHERS, CHARLES.....507 Madison Avenue
SMITHERS, F. S.....180 West 59th Street
SMYTH, PHILIP A.....57 East 127th Street
*SOPER, A. W.
SOLTMANN, G. E.....Bedford Park
SOTSCHECK, CARL.....1773 Clay Avenue
SOUTHACK, FREDERICK.....48 West 53d Street
SOUTHARD, GEORGE H.....85 Remsen Street, Brooklyn
SPENCER, SAMUEL.....80 Broadway
SPITZNER, GEORGE W.....12 East 74th Street
SPRING, MISS ANNA RIKER.....434 Madison Avenue
SPURR, E. W.....110 Worth Street
SQUIBB, DR. E. H.....148 Columbia Heights, Brooklyn
STANTON, JOHN.....13 William Street
STANTON, JOHN R.....256 West 70th Street
STARR, LOUIS MORRIS.....3 West 53d Street
STEBBINS, JAMES H.....80 Madison Avenue
STEEVES, JOHN F.....138th Street and Fourth Avenue
STEINBECK, EDWARD.....4378 Third Avenue
STEPHENS, OLIN J.....146th Street and Gerard Avenue
STERLING, THEODORE WELD.....18 East 40th Street
STERN, ISAAC.....Care of Stern Brothers, West 23d Street
STERNBACH, CHARLES.....129 East 69th Street
STEVENS, FREDERIC W.....18 West 34th Street
STEWART, WILLIAM R.....31 Nassau Street
STIMSON, DR. DANIEL M.....11 West 17th Street
STOKES, H. B.....New Rochelle, N. Y.
STOKES, J. G. PHELPS.....229 Madison Avenue
STONE, MASON A.....244 Central Park West
STONEBRIDGE, CHARLES H.....2656 Third Avenue
STONEBRIDGE, G. E.....4143 Park Avenue
STOW, GEORGE G.....49 East 25th Street
STRATFORD, PROF. WILLIAM.....263 West 52d Street
STREAT, JAMES.....62 Leonard Street
STUART, INGLIS.....69 Wall Street
STURGES, HENRY C.....56 East 34th Street
STUYVESANT, RUTHERFURD.....18 Exchange Place
SULLIVAN, MRS. JAMES.....36 Park Avenue
SULLIVAN, MARK S.....1 Brewers Block, Cambridge, Mass.
SUTPHEN, JOHN S., JR.....9 Desbrosses Street
SWAYNE, FRANCIS B.....Riverside Avenue and 90th Street
SYMS, DR. PARKER.....50 West 47th Street
TABER, MISS MARY.....9 East 10th Street
TAFT, HENRY W.....40 Wall Street

* Deceased.

TAINTOR, CHARLES WILSON.....Schenectady, N. Y.
TAIT, A. F.....15 Fairfield Place, Yonkers, N. Y.
TALCOTT, JAMES.....7 West 57th Street
TATHAM, CHARLES.....302 Lexington Avenue
TAYLOR, MISS ALEXANDRINA.....48 West 59th Street
TAYLOR, DWIGHT W.....500 Madison Avenue
TAYLOR, GEORGE.....8 West 126th Street
TAYLOR, HERBERT C.....52 Broadway
TAYLOR, KNOX.....Highbridge, N. J.
TAYLOR, MOSES.....6 East 72d Street
TEFFT, F. GRISWOLD.....Manhattan Club
TEFFT, WILLIAM E.....22 East 64th Street
TENNY, C. H.....Metropolitan Club
TERRY, JNO. T.....Tarrytown, N. Y.
TERRY, REV. RODERICK.....169 Madison Avenue
TESLA, NIKOLA.....46 East Houston Street
THACHER, MRS. GEORGE W.....Care of Charles A. Peabody, 2 Wall Street
THACHER, THOMAS.....25 Broad Street
THAYER, HARRY BATES.....57 Bethune Street
THOMAS, DR. ALLEN M.....45 West 54th Street
THOMAS, SAMUEL.....17 West 57th Street
THOMAS, SETH E.....8 West 20th Street
THOMPSON, ROBERT MEANS.....99 John Street
THOMPSON, PROF. W. GILMAN.....34 East 31st Street
THOMSON, DAVID.....14 East 73d Street
THOMSON, GIRAUD F.....141 Broadway
THORNE, NEWBERRY D.....New Rochelle, N. Y.
THORNE, W. V. S.....43 Cedar Street
TIFFANY, LOUIS C.....27 East 72d Street
TILFORD, HENRY M.....24 West 52d Street
TILLINGHAST, WILLIAM H.....26 East 64th Street
*TILT, ALBERT.
TILTON, JOSEPH W.....31 East 30th Street
TOD, J. KENNEDY.....45 Wall Street
TOEL, WILLIAM.....20 East 67th Street
TONNELE, WALTER.....12 East 15th Street
TOOTHE, WILLIAM.....Madison, N. J.
TOSTEVIN, WILLIAM P.....Darien, Conn.
TOWNSEND, ISAAC.....Union Club
TOWNSHEND, JOHN.....302 West 73d Street
TOWS, COE DOWNING.....34 West 52d Street
TRASK, SPENCER.....27 Pine Street
TROWBRIDGE, EDWIN D.....16 Nassau Street
TROWBRIDGE, FREDERICK K.....115 East 37th Street
TRUAX, CHARLES H.....12 East 65th Street
TUCKERMAN, ALFRED.....1123 Broadway
TURNBULL, ROBERT J.....6 West 47th Street

* Deceased.

TURNURE, GEO. E.....115 East 36th Street
UNDERWOOD, WILLIAM LYMAN.....Belmont, Mass.
UPP, THOMAS M.....Perry Avenue and Holt Place
VALENTINE, DR. WILLIAM A.....34 West 38th Street
VAN BRUNT, C. H.....10 East 46th Street
VAN CORTLANDT, AUGUSTUS.....Tuxedo Park, N. Y.
VANDERPOEL, MRS. JOHN A.....224 Madison Avenue
VAN DER SMISSEN, DR. G. J.....2081 Bathgate Avenue
VAN DER SMISSEN, GILBERT.....2081 Bathgate Avenue
VAN EMBURGH, D. B.....30 East 38th Street
VAN NEST, MRS. ALEXANDER T.....31 West 37th Street
VAN NEST, G. WILLETT.....14 East 60th Street
VAN NORDEN, WARNER.....29 West 57th Street
VAN PELT, GILBERT S.....123 East 69th Street
VAN WINKLE, EDGAR B.....115 East 70th Street
VAN WINCKLE, GEORGE S.....1 Broadway
VICKER, H. MONTAGUE.....7 Wall Street
VIELE, HERMAN K.....146 East 35th Street
VIVANTI, FERRUCCIO ANSELMOL.....995 Madison Avenue
VOGEL, HERMAN.....106 East 37th Street
VON DUERING, DR. ADOLPH.....552 East 155th Street
VON KADICK, DR. HANNS M.....Maspeth, L. I.
VORCE, A. D.....353 Fifth Avenue
WADSWORTH, CLARENCE S.....Middletown, Conn.
WADSWORTH, W. P.....25 East 30th Street
WAGSTAFF, C. DU BOIS.....Babylon, L. I.
WALLER, ROBERT, JR.....66 Broadway
WALTON, WILLIAM.....360 West 22d Street
WANNINGER, CHARLES.....114 East 95th Street
WARD, CHAS. H.....159 West 73d Street
WARD, HENRY C.....431 Fifth Avenue
WARD, J. Q. A.....119 West 52d Street
WARDWELL, WILLIAM T.....21 West 58th Street
WATERBURY, JOHN I.....20 Wall Street
WATSON, CHARLES F.....South Orange, N. J.
WEATHERBEE, EDWIN H.....240 Madison Avenue
WEBB, G. CREIGHTON.....47 East 44th Street
WEBB, DR. W. SEWARD.....Shelburne, Vt.
WEBER, LOUIS.....9 East 93d Street
WELLINGS, JOSEPH G.....628 West 147th Street
WELLS, OLIVER J.....Waldorf-Astoria
WENDELL, MRS. JACOB.....8 East 38th Street
WERTHEIM, H. P.....27 William Street
WESTERGREN, M. F.....380 Mott Avenue
WESTOVER, M. F.....Schenectady, N. Y.
WHITAKER, H. P.....Hotel Netherlands
WHITE, JOHN JAY, JR.....103 East 57th Street
WHITE, LEONARD D.....39 East 74th Street

White, Stanford.....160 Fifth Avenue
White, S. V.....7 Wall Street
White, William W.....49 Broad Street
Whitehouse, J. Henry.....Irvington-on-Hudson
Whitin, Louis F.....9 West 56th Street
Whiting, Giles.....898 Broadway
Whitman, Clarence.....5 East 76th Street
Whitney, Caspar.....3 Washington Square North
Whitney, Harry Payne.....2 West 57th Street
Whitney, Miss E. C.....11 Madison Square
Whitridge, F. W.....59 Wall Street
Wickersham, George W.....40 Wall Street
Wiggin, Frederick Holme.....55 West 36th Street
Willard, E. A.....21 State Street
Willets, Robert R.....303 Pearl Street
Williams, G. G.....270 Broadway
Wills, Charles T.....156 Fifth Avenue
Wilmerding, Gustav L.....38 Nassau Street
Wilson, William.....Briggs Avenue, near 201st Street
Windmuller, Louis.....20 Reade Street
Winthrop, Egerton L.....23 East 33d Street
Winthrop, R. Dudley.....P. O. Box 17, New York City
Witherbee, Frank S.....40 Wall Street
Witte, C. W.....747 Tremont Avenue
Wolff, Emil.....115 West 70th Street
Wood, Gilbert Congdon.....51 Fifth Avenue
Wood, J. Walter.....South Orange, N. J.
Wood, J. Walter, Jr.....Short Hills, N. J.
Wood, William C.....51 Fifth Avenue
Wood, William H. S.....51 Fifth Avenue
Woodhouse, J. S.....341 West 87th Street
Woodward, F. F.....Hotel San Remo
Woolf, James A.....1821 Trane Place
Wooster, Noyes C.....38 West 35th Street
Worthington, Charles C.....214 Broadway
Wortman, Dr. J. L.....Peabody Museum, New Haven, Conn.
Wright, J. Dunbar.....346 Lexington Avenue
Wright, J. Howard.....2 Wall Street
Wright, Mrs. Mabel Osgood.....118 West 11th Street
Youmans, Ephraim M.....2020 Broadway
Young, Frederick Stafford.....11 West 19th Street
Young, John Alvin.....49 Wall Street
Young, Richard N.....11 West 19th Street
Yerkes, Charles T.....54 Wall Street
Zabriskie, Andrew C.....716 Fifth Avenue

Corresponding Members.

BAKER, HERBERT.....Yuma, Arizona
BARBOUR, MRS. S. E.....Eau Gallie, Florida
BROWN, WILLIAM HARVEY.....Salisbury, Rhodesia, South Africa
CORNISH, C. J.....Oxford House, Chiswick Hall, London, W., England
EATON, HOWARD.....Medora, North Dakota
ELROD, M. J.....Missoula, Montana
GOLDING, CAPTAIN THOMAS.....London, England
GRAHAM, W. H. H.....Winnipeg, Manitoba
GRIFFITH, WILLIAM A.....Quebec, Canada
HAGENBECK, CARL.....Thierpark, Hamburg, Germany
HUFFMAN, L. A.....Miles City, Montana
MCCARTY, JOHN.....Phœnix, Arizona
MARE, R. L.....St. Johns, Newfoundland
SHELDON, CHARLES.....Chihuahua, Mexico
STONE, ANDREW J.....New York City
WILSON, T. E.....Banff, Alberta
WILTSEE, E. A.....Crocker Building, San Francisco, Cal.

Summary of Membership.

Total number of Founders		26
" "	Associate Founders	12
" "	Patrons	53
" "	Life Members	139
" "	Annual Members	952
Total of all classes		1,182
Members deceased		34

Form of Bequest.

I do hereby give and bequeath to the "NEW YORK ZOOLOGICAL SOCIETY," *of the City of New York*,.....

.....

.....

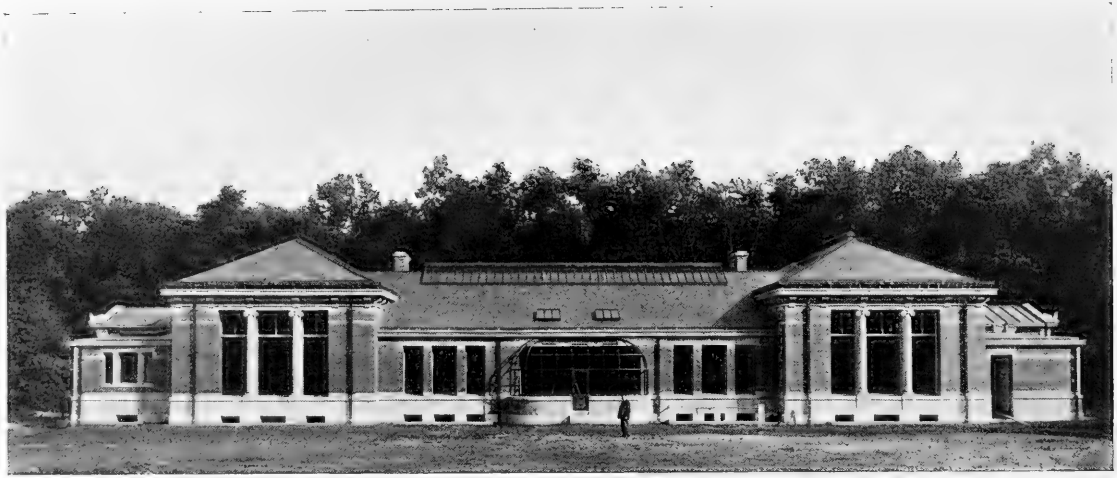

PHOTO BY E. R. SANBORN.

PRIMATES' HOUSE.

REPORT

OF THE EXECUTIVE COMMITTEE.

THE chief events of the year 1901 were the raising of the remainder of the Park Improvement Fund of $250,000, the opening of the new House for Primates, the establishment of a medical department for the care of the animals, and the beginning of the permanent Zoological Bulletin.

COMPLETION OF PARK IMPROVEMENT FUND, AND FINANCES OF THE SOCIETY.

The Park Improvement Fund marked the fulfillment of all the obligations to the City assumed by the Society in its agreement of March 27, 1897, with the City. At that time we promised to raise and expend upon the Park, on or before August 11, 1901, not less than $250,000. These conditions, while more onerous than those assumed by the other scientific institutions of the City, were kept to the letter, and the Executive Committee had the satisfaction of officially notifying the Mayor, the Comptroller, and the Park Department on June 17, 1901, that the Society had not only expended the sum required, but some $17,000 in addition for plans and for engineering, long before the expiration of the time limit.

The Society thereby acquired the title to the land now occupied by it, which can only be forfeited by failure to maintain a zoological collection in the Park. For this purpose we have the guarantee of a constantly increasing membership, and the income derived from the various Park franchises. The amount of such franchises during the year 1901 was $5,497.09. These sources of income should ultimately be sufficient for increasing the Park collections and the purchase of new types; but this desired result is still some years in the future.

Following this report will be found a complete statement of the expenditures from the Park Improvement Fund to December 31, 1901. This fund as continued will contain the unexpended balance and such large subscriptions as are from time to time made for the purchase of animals, for construction, and for the general purposes of the Society.

The General or Annual Membership Fund has been swelled during the year by an increase in our members, but is still far from being adequate. This fund covers the various branches of the Society's work, and must be increased to meet the increasing demand for animals. The actual increase in membership during the year has been one Founder, one Associate Founder, ten Patrons, twenty-four Life Members, and one hundred and twenty-nine Annual members, making a total of 165 new members.

The one way in which each and every member of the Society can assist the Executive Committee is by interesting their friends. The Executive Committee is, and has been, making every effort to increase the membership of the Society. While the thousand mark has been passed, the Society will not be in a safe position, as regards its fixed income, until out of the great population of New York City, at least three thousand members, paying ten dollars apiece annually, are secured. There must be, during the coming year, a general effort to add to our roll of members. If each existing member would send in but one new name during the year, the Committee will greatly appreciate the co-operation.

The Society is entirely free from debt and outstanding obligations, other than those covered by cash on hand, and the financial status of the Society is on an absolutely sound basis.

RELATIONS WITH THE CITY.

During the past year the relations between the City authorities and the Society have been extremely satisfactory, and the Committee desires to publicly acknowledge its sense of obligation not only to the Board of Estimate and Apportionment, but to the Hon. August Moebus, Commissioner of Parks for the Borough of the Bronx.

The Society has again been obliged to supply considerable deficiencies in maintenance out of its own funds; the City au-

thorities, on the other hand, while failing to fully realize and appreciate the scale on which the Society was working, were comparatively liberal in their treatment of the Park.

The matter stood as follows: the Maintenance Fund for the year 1901 was $65,000, and proved inadequate, as was anticipated in our last Report. The Society met the deficiency, which amounted to about $4,000. For 1902 the City has provided a fund of $85,000. This fund is less than was asked for by the Society, and will prove, even with strict economy, insufficient for the needs of the Park during the coming year; especially as the cost of maintaining the Lion House, which will be opened during the last months of the year, will be greater than anticipated. This building is likely to be completed some months ahead of time, and consequently the Society may again be called upon to make up a deficiency during the coming year.

The Ground Improvement Fund, supplied by Chapter 432 of the Laws of 1900, became suddenly exhausted during the Spring, owing to the unexpectedly large cost of the Lion House, and the Society has been obliged to complete out of its own Park Improvement Fund, certain work which should have been done by the City.

The Director's report contains an itemized statement of the work accomplished with this fund. Special attention should be called to the completion of an elaborate system of sewerage and of water supply, the lack of which has been a source of great inconvenience. The motor road, except in its eastern extension from the Rocking Stone restaurant to the Buffalo Entrance, has also been completed, and a large amount of work for the preservation of the Park forests has been done under the direction of the Chief Forester.

BAIRD COURT.

During the past year the work of erecting the large buildings located on Baird Court was begun. This Court, when finished, will be characterized by a classic formality, in contrast to the remainder of the Park, which will be left, as far as possible, in a natural state. Of the great buildings to be erected here, the House for Primates is nearly completed, and was opened to the public on December 21, 1901. The contract for this building was awarded to Thomas F. Cockerill & Son for the sum of

$59,700, and the work has been executed by this firm in a manner extremely satisfactory to the Park Department and to the Society. The opening of this building was very timely, because our large collection of monkeys, which had accumulated during the summer, was much crowded in the Small Mammal House. While the Society was fortunate in escaping any special mortality among the primates, many of the more interesting species could not be placed on exhibition, owing to the absence of heated quarters. The removal of these animals to their new quarters in the Primate House made available a large number of cages, which can now be used for the exhibition of small mammals.

The Committee desires to call the attention of the Society to the modeling of the frieze and pediment of the House for Primates, which were executed by Mr. A. P. Proctor, and especially to two large Hamadryas Baboons, the models for which have been presented to the Society by the sculptor. The heating and ventilating of this building—in fact all its appointments—have proved perfect.

The contract for the Lion House, which is located at the southwest corner of Baird Court, was let on June 17, 1901, to the same contractors, Thomas F. Cockerill & Son, for $134,500. This amount, however, does not include the contract for $8,300 with Mr. Eli Harvey, who has been employed to do the modeling and carving of animal sculptures in connection with this building, or the commissions of the Architects. Mr. Harvey's work includes an elaborate frieze and the modeling and cutting in granite of the four sentinel lions to be placed on either side of the north and south entrances. These items will bring the total cost to something over $150,000. Work has also progressed on this building in a very satisfactory manner, and the Society expects to be able to install its collection during the summer of 1902.

COMPLETION OF BAIRD COURT.

The general design of Baird Court and its approaches, as submitted by Mr. Caparn, was approved last year. The design of the details will be undertaken at once by Messrs. Heins & La Farge; in the meantime extensive excavations have been made for tree-planting to shade the Court. It will probably be

INTERIOR OF PRIMATES' HOUSE.

necessary to plan the Bird House on a larger scale than as originally designed, because experience has shown that large as the buildings are, they are insufficient to accommodate the crowds which visit the Park on public holidays and Sundays.

For the coming year the Society has applied for the appropriation of an additional Ground Improvement Fund of $500,000. With this amount, Baird Court, its buildings and approaches on the north, and the Bird House can be completed. One of the chief purposes of this fund will be the completion of the roads and paths in the Park, so as to accommodate the enormous crowds, which will reach the Park over the line of the new Rapid Transit system. The portion of the Park lying east of the Bronx River must be fenced in to protect it from the depredations of timber thieves; and the unequaled opportunities for enjoyment of multitudes along Bronx Lake must be considered by the erection of a boat-house, and by the development of this portion of the Park, which has heretofore been neglected owing to the lack of funds. From this fund also the Antelope House may be constructed, unless the Society is enabled, through the generosity of some of its members, to erect this building from its own funds. The cost of the building will be about $60,000, and the need of such a structure to shelter during our cold winters the large tropical animals, is imperative. At present the Society is obliged to deprive the buffalo herd of the use of their winter house, in order to install therein a variety of tropical deer and antelope, for which no other heated space is obtainable.

The need for these improvements is immediate, owing to the fact that within two years the terminus of the Rapid Transit system at West Farms will be completed. This will bring to our very gates, for a single fare of five cents, the immense population of New York. The attendance during the last year was 527,145, and the largest attendance for any one day was on Sunday, August 24th, when 20,206 people visited the Park; but these numbers will be dwarfed by the crowds which may be expected in the future. The Committee confidently expects that the present administration will realize the importance of hastening the work in order to prepare for this great influx of visitors.

In this connection it may be said that the Elevated Railroad has been extended during the past year to Fordham, and now carries visitors to within half a mile of the Northwest Entrance.

OTHER BUILDINGS.

In addition to the House for Primates and the Lion House, the restaurant, known as Public Comfort Building No. 1, was completed early in the year, and opened to the public on May 30th. Although not remunerative, it is self-sustaining, and has proved of great service to the public and to the Society.

The Service Building and work-shops in connection therewith were also completed during the year, being located in the rear of the Reptile House, and nearly in the geographical center of the Park. They have proved of great use to the Society and its corps of officers. In it are located the office of the Director and the Chief Clerk, the store-rooms, the kitchen, the cold-storage warehouse, the office of the Chief Forester, Engineer and medical staff and the photographic department. Quarters for the carpenter, the blacksmith, the stable, and shops have been placed in the rear service-yard.

Many smaller installations have also been completed, all of which will be set forth in detail in the report of the Director. In passing, however, reference should be made to the development of a series of installations for wild sheep and goats, in accordance with plans prepared by the Director. Four, fine inclosures have been completed, and rock shelters provided. At present these inclosures contain a pair of aoudad, a pair of mouflon, a Himalayan tahr, and three Spanish ibex. The Director's report also details the various important items of ground improvements accomplished during the year, and the new forms of live animals added to the collections.

COLLECTION OF ANIMALS FOR THE LION HOUSE.

The most pressing need of the Society to-day is, and will be for some years to come, new animals to fill the various installations as they are completed or enlarged. Donations of money, in large or small amounts, are greatly needed for this purpose. It will be necessary for the Society to provide, during the coming spring and summer, funds for the purchase of a large collection of felines for the new Lion House. As far as possible it is the intention of the Committee to purchase young animals caught wild, rather than to purchase stock born in captivity, which are liable to be too closely inbred, and consequently less vigorous than wild stock. Heretofore the cost of the individual

animals comprising the Society's collections has not been large, but with the completion of this house, the Society will be called upon to expend comparatively large sums in the purchase of costly animals, and gifts are desired for this purpose.

SPECIAL GIFTS.

A fund of $3,000 has been presented by Mrs. Frank K. Sturgis for the erection of a gate at the present Buffalo Entrance, in commemoration of her father, the late Philip M. Lydig, who formerly owned a large portion of the land now comprised in the Park. Designs for this gateway are being prepared by the Architects.

The beautiful Alaskan house front and totem pole presented by Mr. E. H. Harriman have not yet been erected, owing to the fact that the most suitable place for these objects seems to be along the river near the Boston Road, and that portion of the Park has not yet been inclosed or protected.

The first special endowment fund received by the Society was provided by the liberality of Miss Caroline Phelps Stokes. In October Miss Stokes presented the Society with a fund of $3,000 to be invested by the Society, and the interest derived therefrom applied for the protection of bird life in the United States. The arrangement for the expenditure of this fund has been referred to Professor Osborn and Mr. Hornaday, in consultation with Mr. Frank M. Chapman.

Miss Stokes was also the first to give a fund toward the establishment of a zoological library by donating $300 to be applied for the purchase of books on birds. This gift was most welcome and has been carefully expended.

An extensive zoological library is one of the most pressing needs of the Society, as the difficulty of properly identifying the rare species of animals constantly arriving at the Park increases with the size of the collection. The Committee proposes, in the near future, to ask for the donation of a fund for the purpose of establishing such a library for scientific work in the Park. This library will be located in the Administration Building, which must be built from funds provided by the Society itself. This building will be used by the members of the Society, and will be open for scientific work in connection with the Park.

SCIENTIFIC WORK.

During the past year an expedition was sent to Alaska, under Mr. J. Alden Loring, to establish the necessary connections in that country, so that the Park may receive from time to time a supply of the little known animals of Alaska, and especially to obtain specimens of the great Kadiak bear and other recently described bear of that country. A brief history of this expedition, with illustrations, follows this report. The next Bulletin will contain a more detailed account, and will be fully illustrated with original photographs.

The medical care of the animals and the scientific investigation of the causes of death have in the past proved a matter of considerable difficulty, but the Committee believes that the problem has now been solved by the establishment of a medical department under the direction of Dr. Harlow Brooks, pathologist, and Dr. F. H. Miller, veterinarian, and a laboratory assistant. So far as we know this is a new feature in zoological park administration. The extremely interesting medical reports presented in this volume show what has already been accomplished, and give great promise for the future.

It is important, now that the most pressing popular work of the Society is well under way, that the equally important scientific work should begin to assume more prominence. This will naturally come under three heads:

1st. Observations on the habits and anatomy of the animals within the Park.

2d. Encouragement of explorations, and descriptions of new types of animals.

3d. Pathological and biological studies on the health of animals.

Progress has been made in all these directions.

It is obvious that expeditions like that of Mr. Loring to Alaska, primarily to collect animals, can also be made a source of addition to our knowledge of Alaskan fauna. Similarly the medical staff, while directly looking after the health of the animals, can make substantial contributions to the study of medicine; and the curators will also enjoy exceptional opportunities of observing and recording the instinctive and other mental activities of the animals under their care. Thus, without encroaching upon the functions of the American Museum of Nat-

ural History, the Society can render substantial service to science in its work upon living types.

A photograph department has been established under the direction of Mr. E. R. Sanborn, and some very excellent results achieved. The Society intends to publish a series of collections of photographs representing the different orders of animals, and to reproduce the more valuable pictures in book form, both for sale and for scientific purposes. The value of a series of photographs of living animals, carefully taken and recorded, cannot fail to be appreciated by the scientific world and by the public. During the spring an exhibit of some of the more interesting pictures will be held, for the purpose of stimulating public interest in the Park.

PARK ADMINISTRATION.

During the past year arrangements were made to insure the Society against liability arising from accidents to employees. In this connection, the Committee desires to express its appreciation of the admirable manner in which the general administration of the Park has been conducted under the control of the Director and his staff.

PUBLICATIONS.

The publications of the Society during the year 1901 consisted of the 3d edition of the Guide Book (the 4th edition is now in process of completion); the 3d edition of Hornaday's "Destruction of our Birds and Mammals," in response to a special public demand for its reprinting; the Fifth Annual Report, and a special publication of the Director's pamphlet on the Mountain Sheep of North America. Bulletins Nos. 5 and 6 have also been published. The form of the Bulletin has been changed in regard to size and binding, and it is intended to reprint some of the earlier numbers, with the current issues, in book form, as soon as a sufficient number have been published to justify this course. In this way a complete history of the proceedings of the Society may be had.

Respectfully submitted,

HENRY FAIRFIELD OSBORN, *Chairman.*

JOHN L. CADWALADER, MADISON GRANT,
JOHN S. BARNES, PHILIP SCHUYLER,
WILLIAM WHITE NILES, CHARLES T. BARNEY.

LEVI P. MORTON, *Ex-officio.*

NEW YORK, January 1, 1902.

Park Improvement Fund

to January 1, 1902

Andrew Carnegie	$11,500 00
Jacob H. Schiff	7,500 00
Percy R. Pyne	7,000 00
Levi P. Morton	6,500 00
William C. Whitney	6,000 00
William K. Vanderbilt	6,000 00
Henry A. C. Taylor	6,000 00
Oswald Ottendorfer	5,250 00
John L. Cadwalader	5,200 00
William E. Dodge	5,000 00
Robert Goelet	5,000 00
J. Pierpont Morgan	5,000 00
William D. Sloane	5,000 00
C. P. Huntington	5,000 00
George J. Gould	5,000 00
Cornelius Vanderbilt	5,000 00
Samuel Thorne	5,000 00
Mrs. Antoinette Eno Wood	5,000 00
Miss Helen Miller Gould	5,000 00
Mrs. John B. Trevor	5,000 00
John S. Barnes	5,000 00
Charles T. Barney	5,000 00
F. Augustus Schermerhorn	5,000 00
Edward J. Berwind	5,000 00
John D. Rockefeller	5,000 00
Charles F. Dieterich	5,000 00
Philip Schuyler	2,500 00
Tiffany & Co.	2,500 00
Morris K. Jesup	2,500 00
James C. Carter	2,500 00
Samuel D. Babcock	2,500 00
George Crocker	2,500 00
Lispenard Stewart	2,500 00
Cornelius Vanderbilt	2,500 00
Hugh J. Chisholm	2,150 00
Henry F. Osborn	2,000 00
Charles W. Harkness	2,000 00
William C. Schermerhorn	2,000 00
William C. Osborn	1,500 00
James B. Ford	1,500 00
Joseph Stickney	1,500 00
Thomas F. Ryan	1,500 00

A. Newbold Morris	$1,250 00
George C. Clark	1,250 00
William H. Webb	1,000 00
Mrs. William H. Osborn	1,000 00
Henry W. Poor	1,000 00
George T. Bliss	1,000 00
J. Howard Ford	1,000 00
Abram S. Hewitt	1,000 00
H. McK. Twombly	1,000 00
H. O. Havemeyer	1,000 00
H. H. Cook	1,000 00
George F. Baker	1,000 00
Newbold Morris	1,000 00
Miss Eva Van Cortland Morris	1,000 00
Roswell P. Flower	1,000 00
Miss Caroline Phelps Stokes	1,000 00
A. Wolff	1,000 00
Cornelius N. Bliss	1,000 00
Mrs. Joseph Stickney	1,000 00
Mrs. A. Newbold Morris	1,000 00
Miss Phebe Anna Thorne	1,000 00
Edwin Thorne	1,000 00
Victor C. Thorne	1,000 00
Joel W. Thorne	1,000 00
Samuel Thorne, Jr.	1,000 00
S. Brinckerhoff Thorne	1,000 00
Adrian Iselin	1,000 00
Mrs. George Lewis	1,000 00
John S. Kennedy	1,000 00
Miss A. B. Jennings	1,000 00
D. Willis James	1,000 00
H. C. von Post	1,000 00
Cleveland H. Dodge	1,000 00
Mrs. Percy R. Pyne	1,000 00
C. Ledyard Blair	1,000 00
Isaac N. Seligman	1,000 00
William Thorne	1,000 00
Francis B. Thorne	1,000 00
Henry S. Thorne	1,000 00
Mrs. Margaret T. Tjader	1,000 00
James B. Taylor, Jr.	1,000 00
Landon K. Thorne	1,000 00
William F. Havemeyer	1,000 00
Mrs. George C. Clark	1,000 00
Eugene G. Blackford	500 00
Walter H. Burns	500 00
James J. Higginson	500 00

J. W. Pinchot	$500 00
Robert S. Brewster	500 00
Charles E. Whitehead	500 00
Edward S. Harkness	500 00
Frederick Sturges	500 00
Lloyd Phoenix	500 00
Transfers from General Fund	11,033 32
Cash	1,075 00
Interest	3,766 31
Dewey Arch Transfers	9,250 00
	$254,224 63
Unpaid subscription	1,500 00
	$255,724 63

Dewey Arch Transfers.

Arnold, Constable & Co	$2,500 00
Very Rev. E. A. Hoffman	1,000 00
George Ehret	800 00
Peter Doelger, Sr	600 00
Quincy Mining Company	500 00
Ladenburg, Thalman & Co	250 00
C. H. Mallory	200 00
William M. Fleitmann	200 00
Lehman Brothers	200 00
Oelrichs & Co	200 00
John L. Riker	200 00
Richard P. Lounsbery	200 00
Bruce & Cook	150 00
Chester T. Billings & Son	100 00
A. N. Burbank	100 00
Lee, Tweedy & Co	100 00
John Stanton	100 00
Frederick Billings	100 00
Eagle Pencil Company	100 00
R. M. Oliphant	100 00
J. H. Jacquelin & Co	100 00
Roessler, Hasslacher & Co	100 00
Smith, Hogg & Gardner	100 00
Calhoun, Robbins & Co	100 00
Thurston & Bradish	100 00
Sherman Evarts	100 00
Parker, Wilde & Co	100 00
James J. Higginson	100 00
Church E. Gates & Co	100 00
Henry T. Carey	100 00

Edmund L. Baylies	$100 00
Einstein, Wolff & Co	100 00
Theodore L. De Vinne	100 00
Eaton, Cole & Burnham Company	50 00
L. & M. Kahn	50 00
M. C. Ogden	50 00
Mrs. A. T. Van Nest	50 00
Miss Mary Van Nest	25 00
D. G. Gautier & Co	25 00
	$9,250 00

Treasurer's Statements

YEAR ENDING DECEMBER 31, 1901.

The annual expenditure of the various funds are shown in appended statements.

PARK IMPROVEMENT FUND: RECEIPTS.

Cash in treasury, January 1, 1901		$656 14
Due from City, account cash advanced for Maintenance and Ground Improvements in 1900		9,618 50
Subscriptions:		
Charles F. Dieterich	$5,000 00	
John D. Rockefeller	5,000 00	
Samuel Thorne (additional)	5,000 00	
Charles T. Barney (additional)	3,250 00	
Edward J. Berwind (additional)	2,500 00	
Arnold, Constable & Co	2,500 00	
Cornelius Vanderbilt	2,500 00	
Percy R. Pyne (additional)	2,000 00	
George Ehret	1,000 00	
Rev. E. A. Hoffman (additional)	1,000 00	
C. Ledyard Blair	1,000 00	
Lispenard Stewart (additional)	1,000 00	
William Thorne	1,000 00	
J. & W. Seligman & Co	1,000 00	
W. F. Havemeyer	1,000 00	
Henry A. C. Taylor (additional)	1,000 00	
Kuhn, Loeb & Co	1,000 00	
George C. Clarke (additional)	1,000 00	
Peter Doelger	600 00	
Quincy Mining Company	500 00	
Henry F. Osborn (additional)	500 00	
Virginia R. Osborn	500 00	
Serena Rhinelander	500 00	
Ladenberg, Thalman & Co	250 00	
A. Newbold Morris (additional)	250 00	
Clark, Dodge & Co	250 00	
C. H. Mallory	200 00	
John L. Riker	200 00	
William M. Fleitmann	200 00	
Oelrichs & Co	200 00	
Lehman Brothers	200 00	
Bruce & Cook	150 00	
The following persons $100 *each:*		
Lewis R. Morris, Church E. Gates & Co., Eagle Pencil Company, Calhoun, Robbins & Co., A. N. Burbank, C. F. Billings & Son, Lee, Tweedy & Co., Thurston & Bradick, John Stanton, Smith, Hogg & Gardner, R. M. Olyphant, Sherman Evarts, J. H. Jacquelin & Co., Roessler, Hasslacher & Co., Henry T. Carey, Parker, Wilder & Co., Edmund L. Baylies, Einstein, Wolff & Co., Theodore L. De Vinne, James J. Higginson, Frederick Billings	2,100 00	
Miscellaneous subscriptions	320 00	—44,670 00
Guide Books		360 92
		$55,305 56

PARK IMPROVEMENT FUND: EXPENDITURES.

Part of guarantee fund of $250,000 included in Statement No. 2.

Mountain Sheep Hill and Enclosures	$2,222 27	
Pumas' Enclosure	235 00	
Raccoon Enclosure	325 00	
Service Building and Yard	1,605 02	
Tortoise Enclosure	401 31	
Lion House	1,723 00	
Monkey House	89 76	
Buffalo Shed	56 18	
Monkey-House Walk	33 50	
Equipment of Restaurant	1,895 11	
Reptile House	250 00	
Architects' Commissions	6,723 39	
Engineering	104 67	
Alaskan Expedition	1,676 19	
Photographs	33 52	
General Expenses	861 50	
Live Animals	8,854 75	
Express Charges on Animals	2,155 18	
Maintenance Shortage for 1900 paid in 1901	1,917 02	
Special Maintenance	498 72—	31,661 09
Return of amounts advanced by Knickerbocker Trust Company in 1900		4,739 56
Interest on same		113 19
Cash in Treasury December 31, 1901		18,791 72
		$55,305 56

H. R. Mitchell,
Chief Clerk.

Charles T. Barney,
Treasurer.

January 1, 1902.

General Fund.

GENERAL FUND: RECEIPTS.

Cash balance in Treasury, January 1, 1901	$863 55	
Annual dues from members	7,730 00	
Life membership fees	3,000 00	
Caroline Phelps Stokes (for Library Fund)	300 00	
Miscellaneous	628 00	
Interest on balances for the year	94 56	
		$12,616 11

GENERAL FUND: EXPENDITURES.

General office expenditures	$1,878 69	
Photograph supplies, photographs and slides	603 78	
Fifth Annual Report	1,038 11	
News Bulletin	383 82	
Guide Books	288 70	
Stationery, printing and office supplies (Secretary's office)	506 81	
Library	462 20	
Expenses of Treasurer's office	711 40	
Employers' Liability Insurance Company	200 00	
Notes on Mountain Sheep	180 53	
Destruction of Birds and Mammals	81 25	
Subscriptions to Zoological Park Relief Association	60 00	
Commissions on Subscriptions	964 50	
Geographical Distribution of Animals	120 00	
Rocking Stone Restaurant	393 67	
Miscellaneous expenses and sundries	579 57—	8,453 03
Cash balance in Treasury December 31, 1901		4,163 08
		$12,616 11

H. R. Mitchell,
Chief Clerk.

Charles T. Barney,
Treasurer.

January 1, 1902.

Animal Fund.

ANIMAL FUND: RECEIPTS.

Cash in Treasury, January 1, 1901		$1 40
Receipts at Park:		
Admission	$2,998 80	
Checking Bicycles, etc	304 15	
Rents	538 50	
Boating Privilege	250 00	
Lunch Room	172 93	
Soda Water	1,123 99	
Miscellaneous receipts	108 72	5,497 09
		$5,498 49

ANIMAL FUND: EXPENDITURES.

For the purchase of animals during the year	$2,964 60	
Express and other charges	334 51	
Traveling and other expenses	342 00	3,641 11
Cash in the Treasury December 31, 1901		1,857 38
		$5,498 49

H. R. Mitchell,
Chief Clerk.

Charles T. Barney,
Treasurer.

January 1, 1902.

Maintenance Fund.

MAINTENANCE FUND: RECEIPTS.

Received from City on account of Maintenance appropriation of $65,000 for the year	$61,801 79
Balance due from City, bill rendered	3,198 21
Shortage for the year	3,714 37
	$68,714 37

MAINTENANCE FUND: EXPENDITURES.

Salaries and labor	$45,217 07	
Tools and hardware	1,552 60	
Paints and oils	617 80	
Sundries	97 77	
Nursery supplies	95 63	
Nursery stock and seeds	282 14	
Office furniture and fixtures	495 36	
Office supplies and printing	431 69	
Uniforms and badges	562 43	
Sanitation	300 23	
Insurance	193 58	
Horses and vehicles	693 40	
Repairs	335 91	
Telephone and electric supplies	140 35	
Telephone service and tolls	338 42	
Postage, telegraph, and express	623 31	
Food for animals	9,686 92	
Fencing materials and netting	409 17	
Ice	421 67	
Fuel	1,903 74	
Signs and labels	298 20	
Medical attendance (employés)	194 00	
Medical attendance (animals)	675 00	
Engineering supplies	44 72	
Drugs and medicines	531 73	
Lumber	951 81	
Cement and sand	199 73	
Miscellaneous supplies	894 76	
Surgical instruments and appliances	47 55	
Plumbing supplies	458 68	
Awnings and shades	19 00	
		$68,714 37

H. R. Mitchell,
Chief Clerk.

Charles T. Barney,
Treasurer.

January 1, 1902.

Ground Improvement Fund.

The New York Zoological Society has received from the Board of Estimate and Apportionment to date the sum of $436,263.50, the expenditure of which is shown in the statement appended.

No. 1.

GROUND IMPROVEMENT FUND: RECEIPTS.

Appropriation of Board of Estimate and Apportionment	$125,000 00	
Appropriation of Board of Estimate and Apportionment	300,000 00	
Premium on bonds	11,163 50	$436,163 50
To Balance, amount expended in excess of appropriation		95 88
		$436,259 38

GROUND IMPROVEMENT FUND: EXPENDITURES.

Following contracts executed by Park Department:		
Bart. Dunn, for constructing and improving grounds for Zoological Park	$30,970 48	
F. W. Timpson, for four toilet buildings	1,400 00	
Page Woven Wire Fence Company, for fencing Park	10,571 84	
L. V. Dunne, for 200 settees	1,200 00	
J. Frank Quinn, for trap-rock screenings	1,677 90	
John C. Rogers, for walks, pools, etc	21,816 73	
John R. Sheehan, for four entrances	8,600 00	
W. H. Wright & Son, for Shelter Pavilion No. 1	3,800 00	
W. W. Ryan, for Public Comfort Building	17,200 00	
Hutchings & Co., for Greenhouse	3,449 00	
W. F. Wright, for Workshop	12,900 00	
Thomas F. Cockerill & Son, Monkey House	59,700 00	
Stone & Thurston, sewers	10,191 27	
John H. Devlin, excavating for planting	8,544 06	
John C. Rogers, Jr., for dam	6,832 42	
Thomas F. Cockerill & Son, for Lion House	134,500 00	$333,353 70
Expended by Park Department for materials		434 09
Expended by Park Department on account of Engineers' and Inspectors' salaries		32,492 50
Carried forward		$366,280 29

Ground Improvement Fund.

(*No. 1 continued.*)

	Brought forward	$366,280 29
Expended by the Society under the direction of Park Department:		
Guard rails	$419 57	
Seeds and plants	2,858 96	
Miscellaneous supplies and sundries	660 32	
Labor	49,343 03	
Cement	542 17	
Pavilion No. 2	301 97	
Lumber	2,560 72	
Fencing materials	4,180 23	
Entrances	432 83	
Top soil	808 05	
Stone	3,113 19	
Monkey House	727 44	
Landscape architecture	122 35	
Engineering supplies	45 19	
Pavilion No. 3	75 00	
Nursery stock	30 15	
Pumas' Enclosure	121 54	
Public Comfort Building	579 49	
Service Building	250 00	
Telephone system	268 50	
Sewer and water supplies	2,538 39—	69,979 09
		$436,259 38

H. R. Mitchell,
Chief Clerk.

Charles T. Barney,
Treasurer.

January 1, 1902.

In addition to the expenditure of $436,263.50, as shown, the Society has expended $251,560.35 (mostly in permanent improvements), which funds were received from its friends by special subscription. The raising and expenditure of this $250,000, as shown in Statement No. 2, fulfilled all agreements made with the City.

COMPLETE STATEMENT OF

Park Improvement Fund.

STATEMENT OF THE EXPENDITURE OF $250,000 BY THE ZOOLOGICAL SOCIETY, IN FULFILMENT OF AGREEMENT WITH THE CITY OF NEW YORK, MADE MARCH 24, 1897.

Expended from Park Improvement Fund, as follows:		
Elk House	$1,915 82	
Burrowing Rodents	2,789 85	
Ducks' Aviary	3,352 75	
Prairie Dogs' Enclosure	804 17	
Flying Cage	10,781 40	
Beaver Pond	3,153 02	
Bear, Wolf, and Fox Dens	20,881 40	
Reptile House	51,023 93	
Bird House	25,855 21	
Mountain Sheep Hill and Enclosures	2,601 82	
Crocodile Pool	1,410 91	
Buffalo House	3,614 02	
Antelope House (excavation)	1,855 08	
Otters' Pool	1,225 26	
Moose Shelter	1,229 92	
Red Deer Shelter	1,083 74	
Small Mammal House	4,719 95	
Caribou Shelter	1,381 07	
Antelope Shelter	1,368 53	
Fallow Deer Shelter	1,280 66	
Polar Bears' Den	3,735 47	
Mule Deer Shelter	189 34	
Elk Shelter	78 16	
Virginia Deer Shelter	165 65	
Pumas' Enclosure	235 00	
Raccoons' Enclosure	325 00	
Service Building and Yard	1,605 02	
Tortoise Enclosure	401 31	
Lion House	1,723 00	
Monkey House	89 76	
General Construction	14,762 83	
Architects' Commissions	16,663 35	
Landscape Architecture	525 00	
Storehouse	655 66	
Engineering	4,407 98	
Ground Improvements	2,679 86	
Buffalo Shed	56 18	
Monkey-House Walk	33 50	
Live Animals	22,971 59	
Equipment of Restaurant	1,895 11	
Miscellaneous accounts and general expenses	4,288 33	
Maintenance shortage 1899	7,038 61	
" " 1900	6,189 33—	$233,043 55
Expended from the General Fund:		
For materials and services in the preparation of plans for the Zoological Park		18,516 80
		$251,560 35

H. R. MITCHELL,
Chief Clerk.

CHARLES T. BARNEY,
Treasurer.

January 1, 1902.

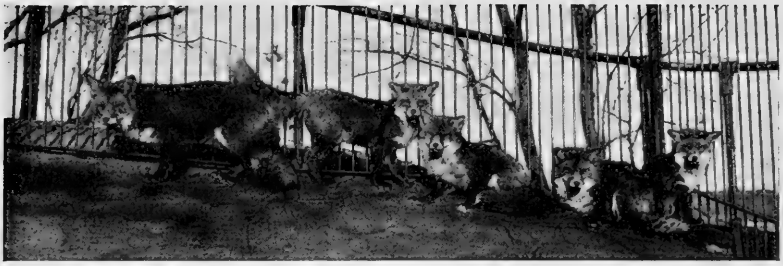

PHOTO BY E. R. SANBORN.

RED FOXES.

REPORT OF THE DIRECTOR OF THE ZOOLOGICAL PARK

TO THE BOARD OF MANAGERS.

DURING the early stage of every new and complex institution, its annual progress is a matter of prime importance to the public.

Throughout the year 1901 the development of the Zoological Park has gone forward with rapidity and precision. By reason of an unusually mild autumn, the building season was much longer than usual, and as a result the record of improvements undertaken and completed during the year is surpassed only by that of 1899. With the finishing of the Lion House, about July 1, 1902, the Zoological Park will stand about one-half completed in accordance with the original plan.

NATIONAL SCOPE.

It is gratifying to observe that even thus early in its history the Zoological Park is regarded by many persons outside of New York as an institution of national interest. Unsolicited gifts of valuable animals have come from many States far distant from New York, and from Mexico, Cuba, England, and Germany. On questions of Zoological Park development, the Society's advice has been sought by numerous organizations and municipalities, and requests for our publications have come from all directions.

Because of the undisputed fact that the Zoological Park is not merely a local institution, the Society has strongly objected

to its being locally nicknamed the "Bronx Zoo," or "Zoo" in any form, with or without a prefix. In deference to written requests, all the newspapers of New York City now mention our institution by its name—Zoological Park.

ATTENDANCE.

During all pleasant weather the attendance of visitors has kept pace with the accommodations for them and the collections available for their entertainment. Up to this time it has been rather fortunate than otherwise that the transportation lines have not been able to bring larger crowds, for were the crowds during fine weather much greater than they now are, the present walks and buildings could scarce contain them. It has been proven conclusively that no matter how large our animal buildings may be, the thousands who throng the Park in fine weather would crowd them full just the same. It is indeed fortunate that the Primates' House, Lion House, new Sea Lion Pool, Wild Sheep Hill, and Osborn's Walk will now open up new areas, and lessen the pressure of visitors elsewhere.

In view of the completion of the rapid transit system at an early date, and the great influx of new visitors which the West Farms terminal will inevitably bring, there is not a moment to be lost in securing the last half of the animal buildings that are so imperatively necessary to the Park.

The attendance of visitors for the year 1901 was in detail as follows:

January	12,483
February	16,167
March	24,544
April	25,822
May	50,381
June	70,770
July	48,375
August	74,264
September	103,503
October	48,995
November	32,687
December	19,154
Total	527,145

PRIMATES' HOUSE AND LION HOUSE.

The most important event of the year was the completion of the Primates' House, and its occupancy. On December 22d it was opened to the public with a collection of 114 primates, representing 42 species. A full description of this building was published in the *Zoological Society Bulletin,* No. 6.

The Lion House is about one-third complete, and bids fair to prove a very satisfactory structure. Its construction is being pushed quite rapidly, and it should be ready for occupancy by June 1, 1902. Unfortunately it is not possible to collect specimens of the larger Felidæ and keep them in temporary quarters for any length of time, consequently the animals for the new Lion House can not be selected and purchased until the building is nearly ready.

NEW INSTALLATIONS FOR ANIMALS.

Mountain Sheep Hill.—The long-deferred plan for a series of inclosures for wild sheep and goats on the rocky hillside immediately west of the Rocking Stone, was this year carried out. Originally the hillside was a chaotic mass of earth, old stone walls, and granite rock. The valley at the foot of the slope was a prehistoric dumping-ground for refuse rock of every description, while hillside and valley were completely overgrown with a tangle of worthless vegetation, chiefly weeds and briar bushes.

But the hillside offered two features of value to an installation for mountain sheep and goats. Height was there, and rough slopes of granite rock; but its successful utilization demanded very careful treatment. In about all other zoological gardens, wild sheep are provided with wholly artificial hills and rocks, built upon level ground, because the work of nature is not there.

The director of the Park was finally authorized to carry out his plan for the development of Mountain Sheep Hill, and by the close of the working season about 75 per cent. of the task had been completed. The rubbish in the valley was hauled away and utilized elsewhere, and thereby the height of the hill was increased. By a judicious removal of earth and useless vegetation, a fine exposure of pink granite rock was secured along the hillside for a distance of about 400 feet, with a maximum height of 25 feet above the valley.

Two dry and warm shelters were constructed in the rocky side

of the hill, a third was built in the hilltop at its highest point, and a fourth remains to be constructed next spring. A very considerable amount of rockwork was built of weathered rock.

Along the bottom and western slopes of the ridge, wire fences were erected, and transverse partitions of the same divided the hill into four spacious inclosures. One of these is now occupied by a pair of Barbary wild sheep or aoudad, another by a male Himalayan tahr (wild goat), and a third is devoted to the pair of mouflon presented by Maurice Egerton, Esq., of London. In their new homes, all these animals show off to most excellent advantage, and seem like different creatures from what they were when kept in ordinary flat corrals. The Page wire fences are so inconspicuous, the value to the surrounding landscape of the rugged, rocky hill is not in the least diminished by its practical utilization as a home for wild animals.

The entire cost of this improvement has been borne by the Zoological Society, but the macadam walk in front of it was constructed at the expense of the Ground Improvement Fund.

The Raccoons' Tree.—To accommodate a very interesting American animal, the raccoon—many specimens of which have been in the Park ever since the opening day, but poorly exhibited—a very generous arrangement has been effected. At the south end of the Bear Dens, and therefore in close proximity to the raccoons' plantigrade relatives, a thrifty young cedar-tree has been encircled by a low iron fence with an overhang. Around the trunk of the tree has been built a rustic shelter-house, and its 8 rooms are now occupied by 14 raccoons of various ages and degrees of fatness. The animals have an abundance of room, adequate shelter from all kinds of disagreeable weather; they can bathe at will, and except in cold weather, when snugly housed in their winter homes, some of them are always visible to visitors.

New Buffalo Shelter.—Owing to the lack of permanent winter quarters in the proposed Antelope House for the tropical hoofed animals, the buffalo herd is again crowded out of its barn for the entire winter. To provide for the buffaloes, the Society is now erecting a spacious and permanent rustic shed in the southwest corner of the large corral adjacent to the Buffalo Entrance. In shape it is a segment of a circle, and when finished, as it will be about January 20, 1902, will be of great value to the buffalo herd.

The Pumas' House.—As a practical test of the belief that pumas

and lynxes will thrive better and live longer in the open air than in a heated building, the Society has constructed an open-air installation of two compartments. It consists of a spacious log cabin, open on the front side, and provided with dry and warm sleeping-dens, fully sheltered from inclement weather. In front of this are two large inclosures of wire netting, provided with tree-trunks, and floored with mother earth. At present these two inclosures contain one puma and two lynxes, all three of which are in the best possible condition and seem to greatly enjoy their home.

COLLECTIONS.

During practically the whole of the year of 1901 the Zoological Park has been in the embarrassing condition of having almost as many species of animals as it could properly house and exhibit. Excepting the hardy hoofed animals, bears, and a few others, it has been necessary to exercise considerable restraint to avoid the acquisition of specimens which could not be housed. For example, a fine tapir which came to us from South America promised to become such an awkward burden if accepted, that it was promptly transferred to the Washington Zoological Park.

It has been impossible to accept tropical hoofed animals, large felines, pachyderms, ostriches and emus, perching birds, and birds of prey beyond the original stock. Late in the year, in view of the approaching completion of the Primates' House, an effort was made to bring together a collection of apes, baboons, monkeys, and lemurs. The advent of winter found all available space in the Small Mammal House and Tortoise House filled to overflowing with primates, and the gathering of such specimens was temporarily discontinued.

The Society longingly looks forward to the time when, with a complete outfit of buildings and aviaries, it can boldly reach out all over the world for all kinds of living creatures in the serene consciousness that anything can be accepted, and everything received can be fittingly cared for and exhibited.

DEPARTMENT OF MAMMALS.

W. T. Hornaday, Curator; R. L. Ditmars, Assistant.

In this department the most noteworthy events of the year were the formation and installation of a collection of primates,

the increase of the collection of bears, the importation of a choice lot of mammals from Japan, China, and the East Indies, and the purchase of a fine lot of mature North American mammals in Maine, the stocking of the Beaver Pond, and the starting of a collection of Wild Sheep and Goats.

Primates.—On December 22d the new Primates' House was opened to the public with 114 specimens, representing 42 species, gathered from a wide range of sources. The rarest, and in some respects the most wonderful specimens in the collection, are two gelada baboons of the largest size, and in very fine condition. So far as can be learned, these are the only specimens in captivity, and their acquisition was a piece of good-fortune. These specimens are native to Southern Abyssinia, but were found in Moscow, Russia, by the son of Carl Hagenbeck, and purchased by cable at a cost of $750. Of all the baboons, the gelada is the most wonderful in form and habit, and it is also one of the largest in size. Like most baboons, it is quite ferocious in disposition. Its heavy mane and body mantle of wavy dark-brown hair strongly resemble the hair on the shoulders of a musk-ox. Unlike other baboons, its nostrils are placed far back on the muzzle, and the endless grimaces of the animal are quite beyond description.

At one time during the past summer the collection of anthropoid apes contained five orang-utans and one chimpanzee. Several of the former were trained to eat at table in human fashion. During warm weather daily exhibitions of the largest specimen, "Rajah," were given in the open air before immense crowds of visitors. Unfortunately, in October there occurred among the apes an outbreak of septic ulcerative dysentery, caused by the presence of a deadly microscopic organism known as *Balantidium coli,* which caused the death of all the anthropoid apes except the female called "Sally." This animal has been in the Park for nearly two and a half years, and was cured of the dread disease which conquered her companions. Fortunately we have thus far succeeded in preventing the spread of this disease beyond the group of animals first attacked by it. Just how this deadly protozoan first reached our orang-utans remained for three months a complete mystery. A diligent microscopical search of all possible sources of immigration was finally rewarded by the startling discovery that the giant tor-

toises from the Galapagos Islands, exhibited during the summer in a yard surrounding the open-air cages of the apes, were swarming with *Balantidii,* but which had not caused the reptiles the least inconvenience. Since this discovery the giant tortoises have been most rigidly isolated. The health of the baboons, monkeys, and lemurs is excellent, in spite of the crowded condition in which they had to live prior to December 22d.

Believing that members of the Society will be interested in knowing fully the zoological value of the collection of primates on exhibition in the Primates' House on the opening day, the following list of species is offered:

PRIMATE COLLECTION.

List of Species Represented in the New York Zoological Park on January 1, 1892.

Anthropoid Apes.

Orang-Utan	*Simia satyrus*	Borneo
Gray Gibbon	*Hylobates leuciscus*	"

Baboons.

Gelada	*Theropithecus gelada*	S. Abyssinia
Hamadryas	*Papio hamadryas*	North Africa
East African	" *thoth ibeanus*	East "
Long-Armed Yellow	" *langheldi*	N.E. "
Golden	" *babuin*	North "
Mandrill	" *mormon*	West "

Old World Monkeys.

" Black Ape "	*Cynopithecus niger*	Celebes
Magot : " Barbary Ape "	*Macacus inuus*	North Africa
Japanese Red-Faced Monkey	" *fuscatus*	Japan
Pig-Tailed Monkey	" *nemestrinus*	East Indies
Lion-Tailed "	" *silenus*	India
Rhesus Monkey	" *rhesus*	"
Common Macaque	" *cynomolgus*	East Indies
Bonnet Monkey	" *pileatus*	Ceylon
Unidentified (Young)	" *?*	East Indies
Entellus Monkey	*Semnopithecus entellus*	India
White-Collared Mangabey	*Cercocebus collaris*	Africa
Sooty Mangabey	" *fuliginosus*	"
Moustache Mangabey	*Cercopithecus cephus*	"
White-Nosed Mangabey	" *petaurista*	"
Mona Monkey	" *mona*	"

PHOTO BY E. R. SANBORN.

PRONG-HORNED ANTELOPE HERD IN 1902.

Green Monkey	*Cercopithecus callitrichus*	Africa
Vervet "	" *pygerythrus*	"
Patas "	" *patas*	"

New World Monkeys.

White-Throated Sapajou	*Cebes hypoleucus*	S. America
White-Faced Sapajou	" *lunatus*	"
Hooded Sapajou	" *fatuellus*	"
Red-Faced Spider Monkey	*Ateles paniscus*	"
Black-Faced Spider Monkey	" *ater*	"
Hooded Spider Monkey	" *cucullatus*	"
Squirrel Monkey, or Common Marmoset	*Chrysothrix sciurea*	"
Gray Spider Monkey	*Ateles geoffroyi*	"

Lemurs and Lemuroids.

Spotted Lemur	*Lemur varius*	Madagascar
Mongoos "	" *mungoz*	"
Ring-Tailed Lemur	" *catta*	"
Blue-Gray Lemur	" ?	"
Large-Eyed "	" ?	"
Black Lemur	" *macaco*	"
Brown "	" ?	"
Galago	*Galago galago*	Africa
Slow Lemur	*Nycticebus tardigradus*	India

Bears.—The collection of bears is rapidly increasing, both in number and in scientific interest. The efforts put forth to bring together a choice series of representative bears have been very well rewarded, and the present dens are now filled to overflowing. The first object has been to secure a fine series of American specimens of all species, and also to show all known variations of the American black bear, from jet black to the lightest brown "cinnamon." We next sought Old World species, with several gratifying results.

The two Kadiak bears, presented in 1899 by the Messrs. Niles, have thus far developed finely. The male has completely outgrown the Colorado grizzly of the same age, and although he is less than three years of age, with four years more in which to grow, he is already a very large bear. The coats of the two Kadiaks have now taken on the color and texture of adolescence, and the identity of these specimens as *Ursus middendorffi* may be considered as beyond doubt.

Mr. J. Alden Loring secured in Alaska two fine grizzly bear

cubs, and a smooth-coated brown bear, the identity of which remains to be proven by its growth.

Mr. Ferdinand Kaegebehn succeeded in securing for the Society a pair of silvery gray *Ursus arctos* cubs, direct from Trebizond, which by reason of their beauty and good temper are very desirable.

Mr. Carl Hagenbeck presented to the Society a fine pair of young hairy-eared bears, from northwestern Mongolia (near the geographical center of Asia), which are of much value. A ten-months-old pair of *Ursus arctos* from Central Russia, obtained from Mr. Hagenbeck in exchange, are as much like "silver-tip" grizzlies of that age as one species can possibly resemble another. From Mr. Hagenbeck was purchased a pair of sloth bears from India, and from Captain Golding came 1 Himalayan black bear, 2 Japanese bears, and 2 Malayan sun bears.

It has been our policy to secure young bears and rear them in our own dens, taking great care to avoid the development of bad temper, and also to secure the finest possible growth. In the preservation of ursine temper, much has been gained by strictly prohibiting the feeding of bears by visitors. At present about one-half of our 30 bears are immature, but all save the polars are so good-natured that the keepers enter their dens and drive them to and fro like so many sheep. What is of equal importance, bears that are reared together play with each other instead of fighting.

The following list of the species and varieties of bears now represented in the Park collection may be of interest:

BEARS IN THE ZOOLOGICAL PARK.

January, 1, 1902.

2	Polars, from Nova Zembla	*Thalarctos maritimus.*
2	Kadiak, from Alaska	*Ursus middendorffi.*
1	Grizzly, from Colorado	*Ursus horribilis.*
1	" " Juneau, Alaska	*Ursus horribilis.*
1	" " Porcupine, Alaska	*Ursus horribilis.*
1	Black Bear, from Maine	*Ursus americanus.*
1	" " New York.	
1	" " Pennsylvania.	
1	" " Virginia.	
1	" " Florida.	
1	" " West Ontario. (Brown variety.)	

1 Black Bear, from Mexico.
1 " " Colorado. (Cinnamon variety.)
1 " " Washington (Cinnamon variety.)
1 " " British Columbia.
1 " " South Alaska. (Brown variety.)
2 Brown Bears, from Asiatic Turkey..... *Ursus arctos.*
2 " " " Central Russia..... *Ursus arctos.*
2 Hairy-Eared Bears, from N.-W. Mongolia.... *Ursus piscator.*
1 Himalayan Black Bear..... *Ursus torquatus.*
2 Japanese Bears, from Japan..... *Ursus japonicus.*
2 Sloth Bears, from India..... *Ursus labiatus.*
1 Sun Bear, from Borneo..... *Ursus malayanus.*

30 specimens, representing 10 species.

Prong-Horned Antelope Herd.—Although it is risky to make at this time any statement regarding our herd of prong-horned antelope, nevertheless our success with it during the past year gives us reason to hope that this species can survive here without being attacked by gastro-enteritis.

A year ago last summer we started a new herd of antelope, with ten specimens, about one-half of them adult. Owing to the loss of all those previously allowed to graze on green grass in the range, we decided to try the experiment of keeping a herd in a corral containing no grass, feeding it chiefly on dry food, and carefully regulating the supply of green grass.

This policy was carried out, and the result has been very gratifying. There has been no occurrence of gastro-enteritis. Three deaths have occurred in the herd, two being due to accidents, and one to fighting. The remaining seven animals of the original herd are in as fine physical condition as if they had all this time been living in their home country. They are fat, in fine pelage, lively, and so vigorously playful that their attentions to their keepers are a positive annoyance.

Our experiments with moose, mule deer, and Columbian black-tailed deer have not been as successful as we had hoped, on account of all three of these specimens having been persistently subject to gastro-enteritis, a disease which in them seems incurable. Pending further studies into the causes and prevention of that malady, we will not now renew our stock of moose; but we expect to do so at a later period.

The Beaver Colony.—After unexpected delays and postpone-

ments, the Beaver Pond finally received a stock of animals, and to-day it is one of the most interesting of the minor attractions of the Park. Several specimens came from Brownsville, Tex., and one from Colorado. Mr. Hugh J. Chisholm presented a very handsome pair which came from Canada, and later in the year, three more from Maine. A very characteristic dam, about forty feet long, with an up-stream curve, has been built by the beavers at the lower end of the pond, of poles and sticks which they have cut and peeled, small stones, and mud gathered from the bottom of the pond. In the center of the pond, the animals have built a very comfortable house, about four feet high, of mud and sticks. In cutting the saplings and trees left for them in the enclosure, the beavers began with the smallest, and have now cut everything under six inches in diameter. The larger trees are now being attacked, and are going one by one.

During his autumn vacation Mr. E. R. Sanborn, the Park photographer, discovered in a tooth-pick factory an unlimited supply of green birch-bark, such as beavers love to feed upon, and immediately shipped to the Park a quantity for trial. The beavers have manifested a great fondness for it, and it is now supplied to them regularly in small piles placed on the banks of the pond. Even in the middle of the day they are seen to leave the water, gravely march up to the piles of birch-bark, fill their mouths with the largest pieces available, and solemnly stride back to the water to consume them.

Gifts.—The most noteworthy gifts of Mammals during the year were the following:

1 Pair Mouflon, from Maurice Egerton, London.
1 Pair Siberian Brown Bears, from Carl Hagenbeck.
5 Beaver, from Hugh J. Chisholm.
1 Elk, from Knox Taylor, Ketchum, Idaho.
1 Black Bear, from Señor Cruz E. Gonzalez, Chihuahua, Mex.
2 Cacomistles, from Charles Sheldon, Chihuahua, Mex.
1 Mearns' Coyote, " " " "
1 Ferret, " " " "
1 Badger, " " " "
1 Mexican Gray Fox, " " " "
1 Western Yellow-Haired Porcupine, from W. T. Hornaday.
1 Florida Deer, from Mrs. Arthur Duane, Sharon, Conn.
1 Virginia Deer, from Frederick D. Camp, New York City.

At Merrymeeting Park, Brunswick, Me., were purchased 3 buffaloes, 2 adult woodland caribou, 1 antelope, 3 elk, 3 white-tailed deer, 1 black bear, 3 gray wolves, 2 foxes, 3 raccoons, and 3 porcupines, all of which were in fine condition, and were added to the groups of those species already on hand.

A number of rare and valuable ungulates were acquired during the year, the following being by purchase: 7 Newfoundland caribou fawns, through the kind offices of Robert L. Mare, Esq., of St. Johns, Newfoundland; 1 anoa, 1 sika deer, 2 sambar deer, 1 equine deer, 1 Chinese water deer, 2 aoudad, 1 Himalayan tahr, and 6 prong-horned antelope. A fine female equine deer was received in exchange from the Philadelphia Zoological Society, and a llama is expected shortly from the Washington Zoological Park.

During the summer Mr. Raymond L. Ditmars was appointed assistant to the director in the mammal department, and this arrangement has proven to be admirably adapted to the needs

PHOTO BY E. R. SANBORN.

THE RACCOONS' TREE.

Recently inclosed near the Bear Dens.

of the Park. Mr. Ditmars has rapidly acquired knowledge of the details of his new line of duties, which are merely supplementary to his work as assistant curator, in charge of reptiles, and there is thus opened to him a wider field of usefulness to the Society.

Excepting the two epidemic diseases, gastro-enteritis and septic ulcerative dysentery, the mammals of the Park have been satisfactorily free from serious diseases during the year. All the bears, wolves, foxes, otters, cats, rodents, antelope, elk, buffalo, tropical ungulates of all kinds, European deer, baboons, monkeys, and lemurs are, with but few and trifling exceptions, in prime condition. The following is a statement of the species and specimens on hand December 21, 1901:

	Species.	Specimens.
Primates	42	114
Carnivora	26	73
Pinnipedia	1	3
Rodentia	16	126
Ungulata	22	90
Edentata	1	1
Marsupialia	2	9
Total	110	416

Received by gift	85
Purchased	274
Born	20
On deposit	12

DEPARTMENT OF BIRDS.—*C. William Beebe, Assistant Curator, in Charge.*

The most important addition to the bird department during the past year was the erection of the temporary Pheasants' Aviary, presented by the heirs of Samuel B. Schieffelin. The structure consists of a long, narrow building, with spacious runways in front, each wire enclosure measuring six by twenty-eight feet. Forty-five specimens of pheasants now occupy these new quarters; also flocks of jungle fowl and California quail.

Notwithstanding the temporary nature of this installation, it is a very welcome addition to our accommodations for birds, and its feathered occupants are perfectly comfortable.

During the summer the burrowing owls were installed in an outdoor cage, where they soon dug a burrow, well sheltered from storms, and it is hoped a colony of these curious birds will soon be established here.

As a whole, the birds in the collection have settled down to contented lives, and considering that the past year was the first in which they have been free from constant disturbance by blasting and construction, the number of species which have bred is remarkable. Fourteen species have reared living young, while seven others have deposited eggs.

Those which bred are as follows:

European Herring Gull.	Reeves Pheasant.
Smaragd Duck.	Amherst "
Mallard Duck.	Golden "
Canada Goose.	Silver "
California Quail.	Ring-necked "
Wild Turkey.	Red Jungle Fowl.
Black-Shouldered Peacock.	Ring-dove.

The following laid eggs, but through various causes were unable to hatch and rear their young:

Black Duck.	Bob-white.
Wood Duck.	Screech Owl.
Indian Peacock.	Burrowing Owl.

American Magpie.

The fourteen species which bred are referable to six different orders, a fact which may be regarded as proof of the very satisfactory manner in which the sheltered confines of Birds' Valley have been adapted to the needs of birds, which, in their wild breeding-places, represent almost every quarter of the world.

At one time during the year it was thought that an Ostrich House would be erected, and finished by December, but this hope was not realized. It is full time, however, that the bird department should be provided with two more substantial buildings, heated in winter, and about four large aviaries; for the

present situation is rapidly becoming intolerable. During the winter tropical birds are housed in the Caribou House, Pelican House, and in the old Reptile House lunch-room! Under present conditions it is impossible to permit the bird collections to increase to an appreciable extent.

Notwithstanding a total lack of proper aviary facilities for perching birds, Mr. Beebe and his assistants in the bird department collected during the breeding season the nestlings of about fifteen species of wild birds, and reared them by hand quite successfully. The amount of labor and close attention requisite in such a task may be estimated by the fact that the majority of these young birds required to be fed by hand every hour. The most interesting broods were crows, owls, woodpeckers, robins, blackbirds, orioles, kingfishers, starlings, tanagers, and blue-jays. All these broods were placed on exhibition as soon as it was safe to do so, and they attracted a great amount of attention, particularly from children. The kingfishers alone defied all attempts to bring them to maturity.

Mr. Beebe's studies and persistent investigations of the diseases of birds, and their treatment, have yielded many valuable results. Out of a list of twenty-seven organic diseases which have caused deaths among the birds, all but seven have at last yielded to treatment. Among these seven are tuberculosis, advanced gangrene, a peculiar foot disease, and a stomachic trouble. The two last mentioned will doubtless soon be added to the list of cures. Detailed study has been given to this subject, and the results show that the deaths during recent months have been mainly due to such four-footed pests as cats, weasels, and rats, and to accidents.

Although as yet no new bird-houses have been constructed, by constant effort to meet the conditions demanded in crowded cages and the kindly dispositions of the birds themselves, many species have been successfully caged together. In this way room has been found for the 229 gifts and 270 purchases, which, with 79 specimens collected by members of the department, comprise the 499 additions to the collection during the past year.

Among the most important of these additions may be mentioned the following:

Gifts.—2 jungle fowl, 2 black-winged peacocks, 1 guan, 1 crested curassow, and 1 crowned pigeon, from Homer Davenport; 22

scaled quails, 1 golden eagle, and 4 western red-tailed hawks, from Charles Sheldon; 4 yellow-crowned and 4 black-crowned night herons, from C. D. Brown; and 2 banded fruit pigeons, from Mason Mitchell.

Purchases.—1 whooping crane, 2 sandhill cranes, and 5 demoiselle cranes; 12 brown pelicans, 4 American flamingoes, 4 roseate spoonbills, 2 Javan peacocks, 2 ring-necked pheasants, 2 peacock pheasants, and 2 Mongolian pheasants; 1 Brazilian eagle, and 2 Chinese geese.

The rarest specimen received during the year was an albino bob-white *(Colinus virginianus)*, captured in southern Oklahoma, and presented by Mr. Charles Payne, of Wichita, Kan. Amongst quails, albinism appears to be of exceedingly rare occurrence, and Mr. Payne declares that this bird is "one out of two million."

To the bird department, the most important gift of the year was $300 in cash received from Miss Caroline Phelps Stokes for the purchase of ornithological books. The invaluable aid this will afford in the study of the habits and the care of birds may be judged by the titles of the books as given elsewhere in the annual list of gifts to the Society.

On December 31, 1901, the bird department contained the following birds:

Order.	Species.	Specimens.
Ratitæ	1	3
Longipennes	5	20
Steganopodes	4	25
Anseres	28	225
Odontoglossæ	2	7
Herodiones	14	42
Paludicolæ	4	11
Gallinæ	22	86
Columbæ	3	8
Raptores	19	62
Psittaci	15	24
Coccyges	1	2
Pici	1	1
Passeres	44	143
Fourteen Orders	163	659

	Specimens.
Received by gift	229
Purchased	270
Collected	79
Hatched	199

Net gain during year: 59 species, 234 specimens.

DEPARTMENT OF REPTILES.—*Raymond L. Ditmars, Assistant Curator, in Charge.*

During the past year this department has maintained the high standard it reached last year, and its record for the year is excellent. Fortunately for all concerned, its equipment of installations, excepting the Tortoise House, was complete at the opening of the Park. All its cages are kept well filled, and its most valuable specimens seem destined to live longest.

It is a source of gratification to be able to report that notwithstanding the large number of venomous serpents in the collection, no accidents from them have occurred to any of the men in charge.

The most noteworthy accession in this department during the year was the purchase of five giant tortoises, from the Galapagos Islands. These very interesting specimens will be specially described elsewhere by the Assistant Curator. It is a satisfaction to be able to report that the largest and most valuable of the giant tortoises has greatly improved in health since his arrival at the Park last summer, and is much stronger than six months ago. Now that the monkeys have been removed from the Tortoise House to their own permanent building, the former will be speedily fitted up for its rightful occupants.

Among other important additions made to the collections during the year may be mentioned a giant alligator turtle from Plaquemine, Louisiana, weighing 110 pounds; two Cuban crocodiles from Cuba, gift of Captain A. G. Hammond, 8th U. S. Cavalry; a black iguana from the Bahamas, gift of Mr. A. Van Winkle; a very large monitor lizard, or "Kabra goya," from Ceylon; and three red rattlesnakes from California.

In the month of June, Curator Ditmars and Keeper Charles Snyder spent their vacation in South Carolina, where they collected 134 serpents, 271 lizards, and 4 chelonians.

Thanks to their enterprise, our collection of Southern water-snakes is particularly fine.

In the care of a collection of reptiles, one of the most difficult tasks is the supplying of acceptable food. Aside from the matter of cost, there are many times when the men of the reptile department are taxed to the limit of their ingenuity to obtain a sufficient supply of the right kinds of food. Not long since, it was necessary to kill a number of young rattlesnakes that were born in the Reptile House because of the impossibility of securing enough mice with which to feed them.

It should be stated that the birds and quadrupeds used are killed before being offered as food. Reptiles do not require live food, but in order to swallow an animal satisfactorily, it is best that it be offered while warm, and before rigor mortis has set in.

The following memorandum has been compiled by Mr. Ditmars and Mr. Snyder to show the quantities of certain kinds of reptilian food used during the past year:

389 mice.	408 frogs.
1,410 rats.	26,900 live fish.
1,273 English sparrows.	55 lbs. earthworms.
366 rabbits.	18,000 meal worms.
531 pigeons.	122 large pumpkins.
232 chickens.	2,266 lbs. green vegetables
812 toads.	(grass not counted).

At the close of the year the state of the reptilian collections on hand was as follows:

Order.	Species.	Specimens.
Crocodilia	2	31
Chelonia	24	119
Lacertilia	15	75
Ophidia	44	296
	85	521
Batrachians	13	78
Totals	98	599

	Specimens.
Received by gift	524
Purchased	183
Collected	434
Born	97

SUMMARY OF LIVE ANIMALS ON HAND ON JANUARY 1, 1902.

	Species.	Specimens.
Mammals	110	416
Birds	163	659
Reptiles	98	599
Total	371	1,674

	Specimens.
Received by gift during the year	888
" " purchase	717
Born in the Park	316
Collected	513
On deposit	12

DEPARTMENT OF ADMINISTRATION.—*H. R. Mitchell, Chief Clerk.*

With the growth of the Park the burdensome details of administration naturally increase also. During the past year, however, facilities for doing business have also increased.

Service Building.—In August the new Service Building was completed, and immediately occupied by the administration staff other than the curators, much to the relief of all concerned. The Director, Chief Clerk, and their office assistants, Mr. Dickinson and Miss Morris, occupy Rooms 1, 2, and 3 in the eastern half of the building, on the ground floor. Room 4 is the Storekeeper's Room, for the receipt and issue of all stores and supplies, except food and building materials, and for the storage of tools. Room 5 is the Cook Room, where all cooked foods, meats, and fish for the animals are prepared and issued to the keepers. Room 6 is the Food Store-Room, and No. 7 is Ice House B.

On the upper floor are the offices of the Chief Forester and Constructor, the Civil Engineer, the Society's Photographer

and Assistant Editor, the Medical Assistant, Label Writer, and the store-rooms for publications and stationery.

In the rear of the Service Building is a spacious paved yard, inclosed on three sides by work-shops and store-rooms, which stand in the following order:

EAST SIDE.	WEST SIDE.
Paint Shop.	Plumber.
General storage.	Blacksmith.
	Carpenters.

REAR.

Dissecting Room, Vehicles, Forestry Department. Barn. Lumber Storage.

The Service Building is connected by Park telephone lines with every large building in the Park, the Nursery, and each entrance pavilion. Two fire hydrants are within 300 feet of the building. A fire-alarm gong has been placed on the front of the building, and a 2½-inch hose and chemical fire-extinguishers are accessible within. The building is heated by steam, will shortly be lighted by electricity, and is entirely isolated from work-shops liable to catch fire. The Chief Clerk's office contains good safes, and every reasonable precaution is observed against both fire and thieves.

The Rocking Stone Restaurant.—This Restaurant was opened on Decoration Day, 1901, with a first-class dining-room and a lunch-room, and so far has given complete satisfaction—save on the few occasions when it was overcrowded by patrons. The first care of the Society is that the public shall be well served at reasonable prices, regardless of questions of profit and loss. It is only fair to state that the meals served in the dining-room are in every respect as fine as can be obtained in almost any first-class restaurant down-town. The restaurant, soda-water stands, and the candy stand are managed by the Society, and all are under the personal supervision of Mr. Mitchell. A report of the gross amount of business done by these places during the year will appear in the Treasurer's report. On the whole, the amount of business done by these privileges during the past year has been quite as much as could be expected at this early stage of the Park's existence. Mr. Mitchell is entitled

to great credit for the measure of success that he has already achieved in the management of these difficult features, and for the very substantial sum that has been accumulated during the past year, through his efforts, to the benefit of the animal fund. Even for its first year the Rocking Stone Restaurant seems likely to pay its own expenses, and there is little probability that the Society will be called upon to make good a loss, as was originally apprehended.

At the close of the year the business of the Chief Clerk's office was found to be well up to date, and his books of account, voucher files, and financial reports all in most perfect order.

Soda-Fountains.—The necessity for another soda-fountain in the Park became apparent, and one was established by Mr. Mitchell in the Shelter Pavilion near the Fox Dens, where it was well patronized.

A Candy Pavilion was erected at the Bear Dens.

DEPARTMENT OF FORESTRY AND GARDENING.—*Herman W. Merkel, Chief Forester.*

This department has been conducted with the usual degree of energy and success. Its work naturally falls into six subdivisions:

1. Park Service—such as keeping the Park clean of refuse of every description, and supplying extra labor to all other departments.
2. Supplying vegetable food, ice, live-animal food, etc.
3. Pruning, planting, mowing, and caring for ponds.
4. Grading and seeding new areas and walk-borders, erecting guards, etc.
5. Hot-house work.
6. Rearing of animal food for animals.

All this work is thoroughly systematized, and proceeds with regularity and precision. During the year 1901, in addition to the above, a large amount of ground improvement work was executed under the personal supervision of Mr. Merkel, and paid for out of the ground improvement fund, all of which is listed under the head of " Miscellaneous Ground Improvements by the

PHOTO BY E. H. SANBORN.

AOUDAD'S ROCKS ON MOUNTAIN SHEEP HILL.

Park Department."* This secured far better and more artistic results, and at lower cost, than could possibly have been obtained through advance specifications and a large number of petty contracts.

As stated in a previous report, the cost and trouble of keeping on hand constant supplies of fresh vegetables for animal food led last year to the establishment at the Nursery of a vegetable garden. The results of this experiment were so very satisfactory in every way, and proved so great a saving in cash expenditure, that it was decided to go a step farther and see what could be done in rearing rabbits, pigeons, rats, mice, guinea-pigs, and chickens for the reptiles and the small carnivorous animals requiring a regular supply of whole-animal food. This idea was carried into effect by the conversion of one of the Pheasant Houses presented by the heirs of Mr. Samuel B. Schieffelin into a poultry-house 60 x 18 feet, with wire-inclosed runways on one side.

It has been demonstrated that on an average the animals mentioned above can be bred and reared in the nursery for less than one-half what it costs to purchase them in the market, and the constant availability of this supply is a great advantage to the animals for which it is provided.

A brief summary of the maintenance work of the forestry and gardening department is as follows:

Harvested, stored, and distributed 275 tons of ice.

Laid stone walls under boundary and range fences along the Southern Boulevard and other places, covered with earth, seeded and sodded.

Reconstructed the entire telephone system. Established satisfactory metallic circuits. Installed five new telephones, and equipped Service Building with speaking-tubes.

Constructed large Poultry House, 60 x 18 feet, with wire yards connecting.

Built rabbit-warrens, pigeon-coops, and nest-boxes for rats and mice.

Reared and distributed about $400 worth of live animals for animal food.

Maintained in the Nursery 7,000 trees, 18,000 shrubs and vines, and 4,000 perennials.

*See page 83.

Raised and distributed in the Park over $1,000 worth of vegetables for animal food.

Cut, cured, and stacked 20 tons of hay.

Stocked new Greenhouse at Nursery, propagated a large number of new plants, and restored to a healthy condition great numbers of plants that had become enfeebled through their life in animal buildings.

Supplied moose, caribou, and various other animals with "browse" throughout the year.

Pruned about 700 forest trees.

Planted about 575 trees, and 4,000 shrubs, vines, and perennials.

Maintained plant decorations in the various buildings up to the standards set the previous year, and, in many cases, improved upon them.

Combated tent-caterpillar pest, cutting out and burning over 6,000 "tents."

DEPARTMENT OF CONSTRUCTION AND REPAIR.—*Herman W. Merkel, Acting Chief Constructor.*

From March 1st until December 1st this department furnished employment for a large force of men, and completed many very necessary and important tasks. On September 15th Mr. S. P. Senior resigned from the position of Chief Constructor to accept a position elsewhere, after having rendered to the Society one year of very efficient and satisfactory service. It was then decided to place this department under the direction of Mr. Merkel as Acting Chief Constructor, and this action has resulted very satisfactorily in every way. If it continues to be possible for Mr. Merkel to give to this department, as well as to his own, the amount of personal supervision which it requires, the present arrangement doubtless will be made permanent.

The most important items of service rendered to the Zoological Society, at its expense, were the following:

The development of Mountain Sheep Hill and inclosures.

The construction of Shelter Shed for Buffalo Herd.

The construction of work-shops and store-houses in the sheds around Service Yard.

The construction of a Raccoon's installation.

The placing of additional radiators in Tortoise House.
Construction of plank walks leading to Primates' House.

The work under the supervision of this department by the co-operation of the Park Department for the Borough of the Bronx, and paid for out of the Ground Improvement Fund furnished by the City, will be listed elsewhere under the head of "Improvements by the Park Department." (Page 8.) On account of the number of small items of work to be done, and the extreme difficulty of securing the best results by means of contracts, it became apparent both to the Commissioner and the Zoological Society that the interests of the public required that certain kinds of work should be performed under the personal superintendence of Zoological Park officers. This applies with particular force to tree-planting, the construction of walks among trees, the landscape work on pond borders, fence building, etc.

ENGINEERING DEPARTMENT.—*George M. Beerbower, Civil Engineer.*

During the first half of the year 1901 the Park Engineer surveyed, platted, and staked out Osborn's Walk, Axis Deer Walk, the completion of the sewer system, Beaver Valley Walk, the Motor Road extension, Moose Pond, and four new dens for bears. He prepared plans for the wrought-iron fence around the Raccoon's Tree, which design is the most satisfactory overhang fence that has thus far been constructed for the Park.

During the latter half of the year Mr. Beerbower obtained several months' leave of absence without pay in order to make an important railroad survey in the West. On his return he began to prepare working drawings for the four new bear-dens that are to be built as early as possible in 1902.

IMPROVEMENTS AND EXPENDITURES BY THE PARK DEPARTMENT, BOROUGH OF THE BRONX.

Concerning the City's share of work in the development of the Zoological Park, the year 1901 has been the most important thus far. It has witnessed the completion of two contracts let last year; the letting of five new contracts and the completion of four of them. Besides all this, an immense amount of mis-

cellaneous work has been done. A brief summary of all this work is in order.

Old Contracts Completed:

The Rocking Stone Restaurant, built by Ryan & McFerran, opened on Decoration Day, cost $17,300.

The Service Building, built by Wilbur T. Wright, occupied in August, cost $12,900.

New Contracts Let:

The Primates' House contract was let on January 24, 1901, to Thomas Cockerill & Son at $59,700. From the beginning, on February 10th, work on this building has been pushed with commendable diligence, and in a manner highly satisfactory to the Zoological Society. Mr. Cockerill has taken the greatest pains to secure the best and most satisfactory results, both in materials and workmanship, and it is only fair to say that the same spirit has been manifested by all the sub-contractors. From the beginning of work down to the finish there has been no delay, except as caused by accidents, and none of any kind worthy of mention. On the whole the Society feels greatly indebted to Mr. Cockerill and his sub-contractors for the gratifying results they have produced in the construction of this building.

The Primates' House was opened to the Board of Managers of the Society and Park Commissioners Moebus, Clausen, and Brower for a private view on December 21st, and on December 22d, at 10 o'clock A.M., it was thrown open to the public. It contained at that time 115 specimens of apes, baboons, monkeys, and lemurs, representing 42 species, gathered from the tropics of Asia, Africa, South and Central America. A full description of this building appears in the *Zoological Society Bulletin,* No. 6. The total cost of the structure is $64,160.

The Lion House contract was let on July 11th to Thomas Cockerill & Son at $134,500,* and work began on July 20th. By December 25th about thirty per cent. of the construction had been completed, and work was progressing as rapidly as climatic conditions would permit. This building should be completed and ready to receive its collection of lions, tigers, leopards, and other large felines about July 1, 1902.

* This sum does not include the animal sculptures, nor the architects' commission.

Sewer and Water Systems.—On June 13th a contract was made with Stone & Thurston for the construction of a trunk sewer, with various branches, and additional water-supply lines calculated to render both the sewers and water systems of the Park practically complete. The amount of the contract for both was $10,406.

Starting in at West Farms, an 18-inch trunk sewer of vitrified pipe was laid in concrete through the lower Buffalo Range, along the eastern foot of Rocking Stone Hill, past the Polar Bears' Den and the Beaver Pond, and westward across the head of Beaver Valley. One branch was built along the eastern side of Baird Court to the north end of the Primates' House. The main line went through the elephant corrals to the south end of the Lion House, and another branch led up to the end of the Reptile House sewer, near the Wolf Dens. A short line was built from Kingsbridge Road to the site of the Antelope House, and another drained the stagnant pond in the Buffalo Range. Naturally, the final acquisition of a complete sewer system, with all large buildings properly connected with it, is a very great relief to the Park; and beyond doubt the general health of both men and animals will be promoted. The total length of the sewers laid in the Park under this contract was 5,369 feet. All that now remains in sewer-construction is the short laterals to connect new buildings as they are erected.

The principal water-lines constructed consisted of 4-inch mains leading to the Lions' and Primates' Houses, and the site of the Elephant House. Advantage was taken of this opportunity to form a junction between the Bird House main (6-inch) and the 4-inch main entering the Park through the Elk Range. The complete circuit thus made constitutes a timely precaution against any cutting off of the water-supply of an important building. If one main meets with an accident and becomes inoperative, the other will supply the entire system. The total length of water-lines put down under this contract was 1,754 feet, with 24 manholes, and 3 fire-hydrants.

Dam at Waterfall.—Early in the year the pressure of flood-water against an old stone foundation at the waterfall made a clean breach in the wall. In a few hours thereafter Lake Agassiz was a malarious expanse of mud, with a narrow stream running through it. To have repaired the old wall in a substantial

manner would have cost about $1,000; and in view of the important improvement about to be made at the lower end of the lake, the money thus expended would have been thrown away. Inasmuch as funds were available for the long-contemplated improvement at the waterfall, Commissioner Moebus recommended the immediate execution of the work, in which the Society heartily concurred.

Chief Engineer Schenck immediately prepared working plans and specifications for the erection of a concrete and stone dam about 190 feet long, extending from the most northerly point of the waterfall across to the rocky face of Wilson's Hill, in accordance with the general plan worked out in 1897 by Landscape Architect Charles N. Lowrie. A contract for the work was let on June 13th to J. C. Rogers, Jr., at $6,080, and completed in a satisfactory manner in December, 1901. A heavy core of concrete was constructed throughout the entire distance from the waterfall to Wilson's Hill, and, excepting for a 20-foot spillway near its north end, was raised two feet above the water-level. The quantity of concrete and stone masonry required was 1,050 cubic yards; filling, 1,100 yards; and excavation, 1,300 yards. Between the spillway and the waterfall an island was created, to bear trees and shrubbery, and the masonry was covered with top soil to a depth of one foot. Beneath the spillway the exposed face of the dam has been built of weathered rock laid in rustic form, and the small cascade thus created is a very pleasing new feature, in direct line of vision from the bridge which spans the river at the northeast entrance.

The completion of this improvement accomplishes several important results. It increases the water area in Lake Agassiz by one-third; it adds very greatly to the beauty of that spot; the accidental emptying of the lake is now impossible; an unsightly area of ground is now covered by water, and, lastly, the massive wasteway and 36-inch cast-iron valve built into the dam now renders it an easy matter to drain the lake whenever necessary.

In the spring a very considerable amount of grading, regulating, and planting must be done by the Park force under Mr. Merkel, to provide the necessary turf, vines, shrubbery, and trees that are absolutely necessary on the two islands and the adjacent shores. The cost of this must necessarily be provided by a new appropriation for miscellaneous ground improvements.

Motor Road and Tree Trenches.—The imperative need of a service road leading into the north end of the Park, providing for the approach of heavy teams and carts to the Bird House and the buildings on Baird Court, hastened the construction of the northern third of the line to be used by automobiles carrying visitors, and generally known as the Motor Road. On June 13th a contract was made with J. H. Devlin for the construction of a Telford-Macadam road, 16 feet wide and 1,663 feet in length, at a cost of $8,477.50. This also included the excavation of a series of tree trenches in Baird Court for shade-trees, and filling them with top soil.

The new road leaves the old service road in a " Y " opposite the southeast corner of the Moose Range, runs along the western side of Baird Court and the eastern side of the Ducks' Aviary, and terminates in a roomy oval between the eastern end of Cope Lake and what will shortly be the Carriage Entrance. From this terminus Park automobiles will at no distant day run through the Park to the rapid transit terminal station at West Farms. It now remains to complete this line by the construction of its eastern third, from the Rocking Stone Restaurant to the Buffalo entrance.

In Baird Court 680 running feet of tree trenches were excavated to a depth of four feet and filled with good soil, and in addition to this 500 cubic yards of soil was furnished for trenches requiring no excavation. Mr. Devlin's contract as a whole was finished in December, 1901.

MISCELLANEOUS IMPROVEMENTS, MADE UNDER THE SUPERINTENDENCE OF ZOOLOGICAL PARK OFFICERS.

Mentioned in the order of their importance, the items of work done by day labor in the Park were as follows:

Osborn's Walk, 20 feet wide and 656 feet long, graded and macadamized (Telford plan) from the Bird House to the north end of the Mule Deer range. This gives a fine, spacious, direct entrance to Baird Court and the interior of the Park.

Service Road to Baird Court.—In order to make it possible for building materials to reach the new buildings on Baird Court, it was necessary to construct a substantial macadam service road, leading from a temporary entrance on Pelham Avenue,

near the Bronx River bridge. This road is 16 feet wide and 660 feet long. While it required a considerable amount of labor and material, it will remain in active service until all construction on Baird Court, the Concourse, and the Carriage Entrance has been completed, when it will be obliterated. It was laid out on a course which will not obstruct other road-making.

A Fence Around Baird Court was constructed in order to isolate that region from the grounds accessible to the public. This was necessary to prevent accidents, and to facilitate the work of contractors. Adding to this the various other wire fences erected in the Park during the year, the total length of lines constructed is 6,200 feet.

Mountain Sheep Walk, 16 feet wide and 473 feet long, was constructed along the eastern side of the Wild Sheep inclosures.

Axis Deer Walk, and connections with the Ducks' Aviary, 16 feet wide, total length 542 feet, was constructed.

Birds' Valley Walk, from the Bird House to the Service Road, 740 feet, was raised 6 inches, thoroughly drained and resurfaced, leaving it in first-class condition.

Moose Pond.—In the southeastern corner of the Moose Range a low and boggy spot was excavated, lined with stone and gravel, and made into a fine pond 4½ feet deep. This is to promote the health and comfort of whatever animals may inhabit the Moose Range.

Walks all Around the Rocking Stone Restaurant were constructed; also a

Rough Stone Retaining Wall, in front of the building, requiring 860 cubic feet of stone.

An Area was blasted out of solid rock to enable teams to reach the kitchen door of the Restaurant, and a *Wooden Railing* was erected around it.

A Candy Pavilion was erected at the Bear Dens.

A Rustic Stone Drinking-Fountain was also constructed at the Bear Dens.

Walks of Plank and Macadam were built leading to and around the soda-fountain at the Reptile House, and also leading to the Shelter Pavilion near the Fox Dens.

Shade Trees of many species indigenous to New England were planted along exposed walks, in front of animal inclosures, and in border plantations along the Southern Boulevard and Kings-

bridge Road. These plantings have thriven, and in the shortest time possible will add very greatly to the personal comfort of visitors, the comfort of captive animals, and the beauty and seclusion of the Park.

About 3,200 Shrubs, Vines, and Perennials were planted on the banks of Cope Lake, in the Ducks' Aviary, and in front of buildings, dens, and aviaries.

About 5,000 feet of Walk Borders were graded and filled, topsoiled, and seeded with grass seed.

About 3,700 feet of Wire Guards on walk borders were erected along new walks.

The Islands and Banks in the Ducks' Aviary were faced with stone, to prevent washing down.

The long list of improvements satisfactorily made during the year 1901 is the best commentary upon the relations existing between the Park Department for the Borough of the Bronx and the Zoological Society. Of the funds for ground improvements that have been furnished by the City through the Mayor and the Board of Estimate, the Director believes that every dollar has been expended in such a manner that the public has received its full value in return. Neither time, labor, nor quality of work have been sacrificed through unnecessary formalities or delays, and the objects aimed at in improvement work have been achieved by the most direct and business-like methods.

On the opening of the Primates' House on December 21st, for a private view by the Board of Managers and the Park Commissioners, the Zoological Society, through its Executive Committee, presented to Hon. August Moebus, Park Commissioner for this borough, a large album of Park views, "in appreciation of his constant friendship for and services in the development of the New York Zoological Park."

The Society is also greatly indebted to Chief Engineer Martin Schenck and Chief Clerk Gunther K. Ackerman, of the Park Department for Bronx Borough, for their constant and effective co-operation with the Zoological Society in the promotion of Zoological Park construction work and maintenance. Their cordial interest in the Zoological Park has greatly promoted its development, and its daily work as well.

NEEDS FOR THE FUTURE.

As previously stated, the fulfillment of the Lion House contract will bring the Zoological Park about half way toward completion. It is now vitally necessary that an additional ground improvement fund of $500,000 be secured at an early date for the erection of other buildings for animals and many other improvements equally necessary. To-day, with but very trifling exceptions, all the animal installations of the Park are filled with animals, and many are crowded. Four new bear dens must be erected with the utmost dispatch, to provide adequately for the thirty bears now on hand.

The need for the Antelope House, the Ostrich House, Eagles' Aviary, and large Bird House are painfully apparent. It is humiliating to be compelled daily to admit that there are thousands of birds and mammals which we cannot accept because of the lack of suitable quarters for them. The plans for the Antelope House and Ostrich House are complete, and if funds were available a contract for their erection could be let within ten days.

There are many improvements, both great and small, which must be undertaken and completed by the time the Rapid Transit branch to our West Farms entrance is completed and ready for use. Many of these demands are very pressing. For example, immediately following the completion of the Lion House about July 1, 1902, the southern half of Baird Court must be planted with shade-trees, and provided with extensive macadam walks.

The Zoological Society is ready to provide animal collections for new animal installations, quite as rapidly as the latter are furnished by the city.

Let us hope that nothing will halt or hinder the steady progress of the Zoological Park, and that the end now half secured may by the close of 1903 be attained in full.

Respectfully submitted,

WILLIAM T. HORNADAY,

Director of the Zoological Park.

December 30, 1901.

List of Gifts

TO THE ZOOLOGICAL SOCIETY.

(*Complete to February* 1, 1902.)

ANDERSON, A., New York City:
Fox Squirrel.

AUSTIN, MISS F. B., New York City:
Horned Lizard (2 specimens).

BARBOUR, MRS. S. E., Eau Gallie, Fla.:
Scarlet Snake, Hog-Nosed Snake, Toads (22 specimens).

BARBOUR, THOMAS, New York City:
Patas Monkey, Spider Monkey, Raccoon, Opossum, Horned Lizard (3 specimens), Six-Lined Lizard (2 specimens), Glass Snake, Florida Box Tortoise, Alligator (2 specimens), Corn Snake, Uta, Coral Snake, Bull Snake, Chicken Snake, Coachwhip Snake, Muhlenberg's Turtle, Reeves' Turtle (2 specimens).

BARKER, CAPT. S. C., Sanford, Fla.:
Gopher Snake (2 specimens).

BARRETT, I. S., New York City:
Troupial.

BAYLOS, MISS F., New York City:
Red Squirrel.

BENEDICT, CHARLES P., New York City:
Fer de Lance.

BENSON, J. T., Auburndale, Mass.:
Horned Toad (9 specimens).

BINNEY, MRS. EDWIN, Sound Beach, Conn.:
Gray Fox.

BLANKE, ROBERT G., New York City:
Ocelot.

BOTTOMLEY, JOHN F., New York City:
Alligator.

BOTTOMLEY, SUSANNE, New York City:
Alligator.

BRIDGMAN, MRS. GEORGE H., Elizabeth, N. J.:
White-Throated Capuchin.

BROOKS, MISS M. D., New York City:
Flying Squirrel.

BROWN, BARNUM, New York City:
26 specimens Arizona Swifts, Lizards, and Toads, representing the following species: Ring-Necked Swift (*Sceloporus torquatus*), Spiny Swift (*S. spinosus*), Collared Lizard (*Crotaphytus collaris*), Wislizen's Lizard (*C. wislizenii*), Blainville's Horned Toad (*Phrynosoma blainvillei*), Arizona Horned Toad (*P. cornutum*), Flat-Nosed Horned Toad (*Anota platyrhina*).

BRUTCHER, F. H., New York City:
Ring Dove.

BUFFALO PARK COMMISSIONERS, Buffalo, N. Y.:
Banded Rattlesnake (2 specimens), Copper-Head Snake (2 specimens).

BUHLER, CHARLES, New York City:
Alligator (2 specimens).

BUHLER, MISS EMMA, New York City:
White-Fronted Amazon Parrot.

CAMP, FREDERICK D., New York City:
Virginia Deer.

CHARLTON, EMMET G., New York City:
Canebrake Rattlesnake.

CHISHOLM, HUGH J., New York City:
American Beaver (5 specimens).

COE, MIRIAM S., New York City:
Common Marmoset.

COLBURN, A. E., Washington, D. C.:
Great Horned Owl.

CONSTANTINE, ROBERT, New York City:
Alligator.

COOLIDGE, A., Cotuit, Mass.:
English Magpie.

CORDES, MRS. FRANCES, New York City:
Bonneted Macaque.

CRANE, MRS. M., JR., New York City:
Alligator.

DARLINGTON, DR. T., Kingsbridge, N. Y.:
Snapping Turtle.

DAVENPORT, HOMER, East Orange, N. J.:
Black-Shouldered Pea Fowl (2 specimens).

DEANE, MRS. MARY W., Philadelphia, Pa.:
Canary (28 specimens).

DEMPEWOLFE, TONY AND OTTO, New York City:
Snapping Turtle (2 specimens), Musk Turtle.

DIETERICH, CHARLES F., New York City:
German Partridge (6 specimens).

DOLO, H., Havana, Cuba:
Cuban Terrapin (3 specimens).

DOTTER, G. R., Brooklyn, N. Y.:
Chameleon (2 specimens).

DUANE, MRS. ARTHUR, Sharon, Conn.:
Florida White-Tailed Deer.

DUNHAM, CARROLL, JR., Irvington, N. Y.:
Black Snake (2 specimens).

DUTCHER, WILLIAM, New York City:
Red-Crested Brazilian Cardinal (2 specimens), Strawberry Finch (2 specimens), Japanese Robin, Cut-Throat, Lavender Waxbill (2 specimens), Fire Finch (2 specimens), Orange-Cheeked Waxbill (2 specimens), Crimson-Eared Waxbill (2 specimens), Tiger Finch (2 specimens), Paradise Widow-Bird, Pin-Tailed Widow-Bird, Negro Finch (2 specimens), African Siskin (2 specimens).

EGERTON, MAURICE, London, England:
Sardinian Mouflon (2 specimens).

EGGLING, O., New York City:
Muhlenberg's Turtle.

ELSWORTH, D. S., Watkins, N. Y.:
Silver Pheasant (2 specimens), Golden Pheasant.

EXCELSIOR POULTRY AND WIRE SUPPLY COMPANY, New York City:
Red Fox (3 specimens).

FLEISCHMANN, LOUIS, New York City:
German Nightingale (2 specimens).

FROEHLICH, CAPT. PAUL, S. S. *Phoenicia:*
European Turtle-Dove.

GANNON, DANIEL T., New York City:
Purple Grackle.

GEPPERT, MRS. G. A., New York City:
Fox Squirrel.

GILLESPIE, FRANK B., New York City:
Ring Dove (2 specimens).

GOLDHORN, DR. L. B., New York City:
12 specimens Reptiles, comprising Garter, Coachwhip, Gopher, Corn, Chicken, King Snakes, etc.

GONZALEZ, SENOR CRUZ E., Chihuahua, Mexico:
Black Bear.

GRACE, JOSEPH P., New York City:
South American Puma.

GREENFIELD, MRS. WILLIAM, New York City:
Red-Headed Cardinal.

GROSSMAN, C. B., New York City:
Alligator (2 specimens).

HAGENBECK, CARL, Hamburg, Germany:
Hairy Eared Bear (2 specimens).

HAMLIN, GEORGE H., Orono, Me.:
Raccoon (3 specimens).

HAMMOND, CAPT. A. G., 8th United States Cavalry, Puerto Principe, Cuba:
Cuban Crocodile (2 specimens), Cuban Boa (2 specimens), Cuban Deer (2 specimens).

HANSON, DR. H. D., New York City:
Canadian Porcupine.
HARDING, A. BIGELOW, New York City:
Opossum.
HICKOK, DE LOS, Fordham, New York City:
Garter Snake (3 specimens), Black Snake.
HITZEL, AUGUST, New York City:
De Kay's Snake (2 specimens), Fire Salamander (2 specimens), Spanish Salamander, Chameleon (3 specimens), German Tree Toad (2 specimens), and Metal Terrarium.
HORNADAY, WILLIAM T., New York City:
Yellow-Haired Porcupine, White-Footed Mice (4 specimens).
HOWES, S. F., Stamford, Conn.:
Raccoon (2 specimens).
HUGULEY, MISS HELEN, New York City:
Guinea Pig.
HURD, MRS. L. D., New York City:
Parrakeet (2 specimens).
KAEGEBEHN, FERDINAND, Hoboken, N. J.:
Red Fox.
KAHLE, H., New York City:
Spotted Turtle, Snapping Turtle.
KARATSONYI & KMETZ, Glenwood, L. I.:
Black Bear.
KELLY, PATRICK, New York City:
Blue-Fronted Amazon Parrot.
KOZIELL, F. N. New York City:
Squirrel Monkey, Coati Mundi.
KRAUSS, GEORGE V., New York City:
Parrakeet (2 specimens).
KRUESI, EUGENIE A., New York City:
Green Snake (2 specimens), Red and Water Newt (39 specimens).
LATHAM, MRS. C. F., Grant, Brevard County, Fla.:
Barn Owl.
LAUDERDALE, J. V., JR., Brooklyn, N. Y.:
Alligator.
LONGFELLOW, MRS. AND MR. FREDERICK W., New York City:
Herring Gull (2 specimens).
LOTZ, TONY, Van Nest, New York City:
Snapping Turtle.
MACDONALD, MRS. J. A., Flushing, L. I.:
Coati Mundi.
MCGREGOR, A. M., Mamaroneck, N. Y.:
Pea Fowl (2 specimens).
MCLEAN, FRANK B., New York City:
Bald Eagle.
MAHER, MRS. E., Baychester, N. Y.:
Screech Owl (2 specimens).

MAURER, GEORGE, New York City:
Canary (2 specimens).

MEADE, BENJAMIN, Mt. Kisco, N. Y.:
Snapping Turtle (2 specimens).

MEYENBERG, E., Pecos City, Tex.:
Horned Toad (28 specimens), Texas Box Tortoise, Fox Snake, Hog-Nosed Snake, Red-Saddled King Snake, Red-Shouldered Hawk (2 specimens), 11 Quail Eggs, Texas Rattlesnake (18 specimens), Coachwhip Snake (4 specimens), Marcy's Garter Snake (3 specimens), Emory's Snake, Whip Scorpion.

MEYERS, H. J., East Fishkill, N. Y.:
Gray Fox.

MITCHELL, MASON, Lambs' Club, New York City:
Samoan Dove (2 specimens).

MOEBUS, HON. AUGUST, New York City:
Macaque Monkey, Ocelot.

MUNCHART, WILLIAM, New York City:
Salt Marsh Frog (3 specimens), Pond Frog.

MUTZ, MRS. HELEN, Weehawken, N. J.:
Quail (3 specimens).

NICKERSON, MRS. P. W., New York City:
Purple Gallinule.

NORTON, RICHARD, Ashfield, Mass.:
Albino Woodchuck.

PAYNE, CHARLES, Wichita, Kan.:
Quail, Albino Quail.

PEARSALL, MORRIS, New York City:
Spotted Turtle (3 specimens), Painted Turtle (3 specimens), Garter Snake, Black Snake.
The following specimens were collected by Mr. Pearsall at Bethel, Sullivan County, N. Y.: Banded Rattlesnake (2 specimens), Black Snake (3 specimens), Hog-Nosed Snake, Ribbon Snake (17 specimens), Garter Snake (104 specimens), Red-Bellied Snake (9 specimens), Green Snake (8 specimens), Ring-Necked Snake (13 specimens), Milk Snake (21 specimens), Banded Water Snake (5 specimens).

PHILADELPHIA ZOOLOGICAL GARDENS, Philadelphia, Pa. (*through Arthur Erwin Brown, Superintendent*):
Texas Rattlesnake, Hog-Nosed Snake (2 specimens), Marcy's Garter Snake (4 specimens), Emory's Snake, Horned Toad (10 specimens).

PRAHAR, MRS. L., New York City:
Chameleon.

PRICE, CHARLES P., Melrose, Mass.:
Horned Toad (6 specimens).

PUTNAM, FRED., Owego, N. Y.:
Alligator (2 specimens).

PUTNEY, MRS. HELEN YOUNG, Milford, Conn.:
Levaillant's Amazon Parrot.
RAPADAN, SYLVESTER, New York City:
Alligator (2 specimens).
REMSEN, CHARLES, Remsenberg, L. I.:
Great Horned Owl.
RHODENBURG, GEORGE, New York City:
Chipmunk.
RIGHTER, J. WALKER, New York City:
Black Snake (6 specimens).
ROMES, HARRY, New York City:
Alligator.
ROWE, IVAN H., Yonkers, N. Y.:
Fox Squirrel (2 specimens).
RUILOBA, J. H., New York City:
Cuban Boa.
RUSS, WILLIAM V., New York City:
Red Fox (3 specimens).
RUSSELL, CHARLES ELMER, Bloomfield, N. J.:
Painted Turtle (2 specimens).
SAMUELS, WILLIE, Mt. Vernon, N. Y.:
White-Throated Capuchin.
SCHAEFER, H., New York City:
Ring Dove.
SCHMALACKER, BERNARD, New York City:
Painted Turtle (3 specimens), Spotted Turtle (3 specimens), Muhlenberg's Turtle, Cumberland Terrapin, Box Tortoise.
SCHMIDT, J. J., New York City:
Green Heron (4 specimens).
SCHRADER, MISS M., New York City:
Orange-Winged Amazon Parrot.
SCHWAB, FRANKLIN, New York City:
Alligator.
SCOTT, JOHN D., New York City:
Screech Owl.
SEVERINO, MISS FANNIE L., New York City:
Starling.
SHACKELFORD, MALCOLM, New York City:
King Snake, Garter Snake.
SHELDON, CHARLES, Chihuahua, Mexico.
Coyote, Gray Fox, Ferret, Ring-Tailed Cat (2 specimens), Badger, Red-Tailed Hawk (4 specimens), Golden Eagle, Blue Quail (22 specimens).
SICKLES, GEN. DANIEL E., New York City:
Cuban Boa.
SMITH, EUGENE, Hoboken, N. J.:
Sheltopusic (2 specimens).

STERLING, MRS. J., New York City:
White-Throated Capuchin.
STIEB, HOWARD J., New York City:
Alligator.
STINNER, JOHN, New York City:
Hooded Brazilian Cardinal.
STRAUB, ANTON J., New York City:
Black-Crowned Night Heron.
TAYLOR, KNOX, Ketchum, Idaho:
American Elk.
TEDMON, B. S., Ridgefield, N. J.:
American Magpie.
TIMME, E. F., Spring Valley, N. Y.:
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TITHERINGTON, R. H., New York City:
Squirrel Monkey.
TUNISON, MR. AND MRS. CHARLES V., New York City:
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Iguana.
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Wood Thrush (4 specimens).
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Salamander (41 specimens), Austrian Newt (2 specimens).
WAGNER, L. C., New York City:
Great Horned Owl.
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PHOTO BY E. R. SANBORN.

THE SERVICE BUILDING.

Contains all the executive departments of the Zoological Park.

ANNUAL REPORT OF THE VETERINARIAN.

BY FRANK H. MILLER, V.S.

I RESPECTFULLY beg to submit the following report relative to the animals of the New York Zoological Park under my care—their general health, diseases, injuries, treatment, and feeding from the time of my appointment by the Executive Committee on the recommendation of Professor Osborn.

My first general inspection of all animals installed within the Park, made May 22, 1901, showed them to be in good health, the following cases excepted:

1. One buffalo bull. Sub-chronic intestinal catarrh.
2. One aged buffalo cow. Chronic intestinal catarrh.
3. One prong-horned antelope. Suppurating tendo-vaginitis (chronic).
4. One prong-horned antelope. Severed tendons.
5. One prong-horned antelope. Fractured ribs and abscess on sternum.
6. One Ceram cassowary. Necrotic inflammation of throat.
7. One beaver (just admitted). Lacerated wounds and mangled foot.

Of the above cases, the following disposal was made:

Cases 1 and 2 (the Buffalo) were isolated from the herd and their diet regulated to suit their altered conditions, and the various tonic-astringents commonly used in domesticated ruminants administered, but with very indifferent results. I then concluded to use tannigen, which agent, probably by reason of its passing the multiplex stomach unchanged, exerted its highly satisfactory curative powers within the intestinal canal, speedily induced a normal activity, and the animals were again allowed to enter the herd.

Case No. 3, Suppurating tendo-vaginitis upon leg of Antelope, I treated by chloroforming the animal, opening the infected parts, cleansing the same with hydrogen peroxide, and dressing with iodoform, ether, and bandages. The patient showed satisfactory improvement under daily dressing by the keeper up to the eighth day, when gangrenous conditions appeared, and the animal was removed by chloroforming.

Case No. 4, Antelope with severed tendons, was, upon close examination, found to be inoperable, and the animal was removed from the herd by chloroforming.

Case No. 5, Antelope with fractured ribs and abscesses, received in fighting, was operated upon painlessly by the use of cocaine injections, the pockets drained and packed, after the removal of a segment of detached rib. Daily dressing of the wound was performed by the keeper under my direction, with the result that the abscesses healed rapidly. However, the injury to the sternum proved to be such as to deprive it of adequate nourishment, and necrosis slowly progressed, notwithstanding careful drainage and approved antiseptics, necessitating re-operation upon several occasions, owing to fistulæ being formed. Later it was considered more humane to destroy the animal; first, because of the certainty of long treatment being required; secondly, because of the very unthrifty appearance of the animal in an otherwise healthy herd. Chloroformed.

Case No. 6, Cassowary with necrotic throat, placed under treatment of artificial nourishment and frequent spraying of the throat with saturated solution of boric acid. Since the bird had entirely ceased to take food, and was aged, he rapidly sank, and died on the following day.

Case No. 7, Injured Beaver. Animal was operated on by local application of cocaine; one digit was amputated, and wounds curetted and packed with xeroform powder, and he was allowed to take the water in our beaver pond, with rapid and complete recovery.

The cases which have come under my immediate care since May 22, 1901, have in the main been such injuries and diseases (sporadic and enzootic) as naturally appear in the practice of the general practitioner of comparative medicine, somewhat augmented by reason of the changed conditions incidental to, and more or less inseparable from, the confinement of wild animals.

Even within this Park, conducted as it is with unlimited regard to expense and singleness of purpose to produce surroundings calculated to promote the life, freedom, and happiness of animals, conditions and injuries are oftentimes brought about by reason of the natural ferocity and agility of certain species, which only too frequently involve even our keepers in mishap. Space will not permit, and it would be quite foreign to the purpose of this report for me to enter into general details of all cases under observation. I will therefore briefly name the various cases which have occurred, and take up in greater detail such conditions, as from their particular mortality or liability to infect others must necessarily be considered of prime importance in forming our retrospect of past proceedings, and formulating lines of activity for the treatment and prevention of similar or allied conditions which may appear in future, particularly as to the proper mode of successfully applying our resources that they may be made readily available to the various kinds of animals under our care.

The medical cases, which I name strictly in order of their importance rather than as to frequency among the animals, have been as follows:

1st, Gastro-enteritis.
2d, Infective colitis.
3d, Intestinal catarrh.
4th, Tuberculosis.
5th, Intestinal parasites.
6th, Syngamus trachealis (birds).
7th, Bird cholera.
8th, Verminous bronchitis.
9th, Sarcoptic mange.
10th, Gregarinosis (rabbits).
11th, Group paralysis.
12th, Pernicious anemia.
13th, Convulsions.
14th, Fish poisoning.
15th, Septicæmia.
16th, Rainey's corpuscles (elk).
17th, Hodgkins' disease.
18th, Subcutaneous parasites (birds).

Injuries and conditions requiring surgical treatment may be reported in their relative order of frequency, as follows:

1st, Wounds.
2d, Abscesses.
3d, Contusions.
4th, Fractures.
5th, Amputations.
6th, Distorted feet.
7th, Neoplasms.
8th, Granular conjunctivitis.
9th, Horn punctures.

GASTRO-ENTERITIS OF UNGULATES.

Of the medical conditions which have been treated, by far the most frequent and fatal was acute gastro-enteritis, which prevailed during the hot days of middle and later summer, mainly among our western deer and moose, and was not altogether absent at times from the elk herd. From this disease alone, notwithstanding what we considered the most rational and painstaking adjustment of their diet and entire surroundings, treatment, etc., we lost our entire collection of moose; mainly within the thirty days preceding September 10th.

Up to and during the first week of intense summer heat, this herd, with the exceptions of horn development (which was somewhat deficient), gave every visible evidence of vigorous digestion, and abundance of good health and contentment in their installation. Their illness was first marked by want of cohesion, form, and color in the intestinal excretions, which contained much mucus—a condition seldom giving more than the slightest and most temporary response to the best-known disinfectants and astringents, and which invariably gravitated into acute and persistent diarrhœa. The appetite and rumination alike diminished rapidly, and soon ceased entirely. Emaciation and weakness, with great apathy, quickly supervened, death usually being preceded by a period of coma. Such, in short, were the symptoms exhibited by all animals which were lost within the Park from this particular disease. The most desirable changes of diet known to us were made for these animals, including the limited and unlimited use of mixed browse, which, with the construction of special bathing-ponds, shower-baths, etc., while appearing to give unquestionable additions to their comfort, failed to give the animals that degree of safety for which we had so ardently hoped. While the western deer suffered from this disease, and exhibited the same symptoms, it may be noted that the onslaught of the malady was less rapidly fatal in its consequences among them, than we have noted as affecting the moose; the course having been approximately twelve to fifteen days in the deer, as against five to seven in the moose.

Post-mortem examination of all animals lost, after exhibiting the characteristic symptoms of this disease, revealed the one common condition of *diffuse congestion and inflammation of the abomasum* (true stomach), and to a somewhat lesser degree the

entire digestive tract. The intestinal contents being in the preponderance of cases food in an imperfect state of digestion, mixed with sero-sanguineous fluid. It may be of interest to remark in this connection that, while there was evidence of intestinal atrophy in *all* cases, those of the deer were much more clearly atrophic than those of the moose, possibly because of more prolonged suffering; yet this may have to an extent antedated the actual illness, since I have noticed similar conditions, though in a lesser degree, while examining deer other than those which had suffered from this disease.

The essential element of contagion seemed entirely absent in this disease, since no single case appeared in our numerous species of European and Asiatic deer, although living under identical surroundings and conditions, attended by the same keepers, and at times in close proximity to ranges wherein animals had suffered. I would invite your closest attention to the report of these cases issued by our Pathologist, Harlow Brooks, M.D., who has had occasion to make special research in relation to this most important matter.

INFECTIVE COLITIS.

Second in importance to gastro-enteritis, only by reason of its having been confined to a lesser number of animals, but quite as fatal, I would report our experience with infective colitis due to the invasion of the *Balantidium coli,* whereby three orang-utans and one chimpanzee were lost, and the sole remaining orang was seriously and possibly fatally infected.

The orangs ("Rajah," "Brunei," and "Sultan") and chimpanzee ("Zongo"), which had enjoyed exceedingly good health since their installation within the Park, were first noticed to be slightly indisposed upon the occasion of my visit on October 6th. Showing diarrhœa on the morning of October 7th, they were removed to an isolated room in the Reptile House, and treatment outlined by regulation of diet to meet their altered requirements, and the administration of intestinal antiseptics and astringents. From the coincidence of four cases similar in type, we suspected they might have suffered a mild intestinal infection from the use, in small quantities, of Scott's Emulsion of Cod Liver Oil, which had been in stock for several months, yet seemed to be in a fair state of preservation.

With the exceptions of the cases of "Sultan" and "Zongo," whose cases although obstinate did in a measure yield temporarily to treatment, the disease progressed steadily. Owing to the nature and extent of the constant drain upon the system, and extremely poor appetite—which made adequate nourishment hard, indeed almost impossible to accomplish—the animals emaciated rapidly. Several changes of treatment were thought advisable, and carefully made, including the free use of salol, xeroform, bismuth sub-nitrate, bismuth sub-gallate, opium, etc. All proving equally ineffectual, we called in consultation Dr. Van der Smissen, who has enjoyed much practice in the diseases of children of this part of the city. It having been thought advisable, irrigation of the colon of each was frequently and carefully made with sterilized normal salt solution along with the treatment already administered, but without appreciable result. The animals soon refused to take nourishment voluntarily, and the stomach rejected administered food such as peptonized milk, etc. Their death ensued within twenty-four hours of each other.

The post-mortem examinations made by Park Pathologist Harlow Brooks, M.D., at which I was present, were most interesting as showing the lesions of the entire colon incidental to the invasion of parasites known to science as *Balantidii*, a tropical infection which we at the time, and with much reason, thought had been introduced into the Park by the importation of this particular collection of apes.

The chimpanzee "Zongo" and orang "Sultan" gave temporary hope of ultimate success in treatment, and gained in fair measure a healthful state of digestion, which, however, soon broke down, and despite the most solicitous care and treatment, their intestinal discharges again swarmed with the infusoria. Emaciation was rapid and complete, death following despite our efforts, as in the cases above reported. Post-mortem lesions were in all respects identical to former cases.

The female orang named "Sally," who had been within the Park during the past two years but had been caged at times with the others, first showed emaciation and specific diarrhœa on December 8th. The loss of flesh and prostration was very rapid, the appetite soon failing. As in the other cases, there was marked apathy from the outset. The treatment of quinine bisulphate enemata, so extensively used in human medicine in

treating allied diseases—and thoroughly administered to the animals "Zongo" and "Sultan," but without result—was early replaced in the treatment of this case by high enemata of rice mucilage strongly impregnated with Merck's creoline and thirty grains xeroform. These injections were repeated twice daily, with the result that the animal showed marked improvement. After the first few treatments the parasites rapidly disappeared in number from the excretions, and such as appeared were without life. The patient improved rapidly in all respects, and remained under constant treatment, but showed a sudden exacerbation of symptoms upon December 26th, when the parasites again appeared in great numbers. For a second time the patient began to emaciate and grow apathetic. At present she is being carefully nursed and treated, and appears to be withstanding the disease much better than might be expected in view of the nature of her malady.

Every proper precaution as regards isolation, frequent and effectual disinfection, etc., was early put into effect, and to that I attribute the confinement of the disease to the animals named, since every evidence indicated its invasive nature. The probable error of our judgment in assuming this disease to have gained admission to the Park by reason of infection lurking in some one or more of these animals at the time of their purchase was recently shown. In the routine of affairs, Curator Ditmars on January 2, 1902, caused microscopic examination to be made of excreta from the giant tortoises which were imported last summer, and for a time located in quarters in immediate proximity to the orangs in question. This examination showed the material to be surcharged with infusorial organisms, with *Balantidium coli* in great abundance. Since the reptiles appear to enjoy good health, we are driven to the conclusion that the highly pathogenic organism, *Balantidium coli,* of the large apes, is really the non-pathogenic *Balantidium* of the tortoise, and experiments are now being carried forward to substantiate or disprove this assumption.

The scientific importance of these cases to those engaged in zoological work can scarcely be over-estimated, and will, in my opinion, fully warrant the most careful perusal of our pathologist's report relative thereto.

Our experience with this peculiar infection should make us

very circumspect regarding the receiving of animals, especially from tropical countries, and introducing them into our collections without every effort being made to demonstrate the presence or absence of this disease, which beyond much doubt has the power, under favorable conditions, to destroy the entire primate collection.

That which I am inclined to regard as the third most important condition of our animals requiring special treatment was intestinal indigestion, mainly confined to the adult buffalo.

INTESTINAL CATARRH OF BUFFALO.

Within the past six months there have been under treatment one chronic and five sub-chronic cases of this troublesome disorder, all of which have been isolated and relieved, after longer or shorter periods of dieting and medication.

This condition proves particularly troublesome from the difficulty at times found in isolating such animals, in the selection of agents which they will take voluntarily in the food or water, and, above all, in the selection of those remedies which will, in non-toxic doses, pass through a stomach containing, as it oftentimes does, sixty gallons of food matter, and reach the diseased intestine in a state capable of exerting therapeutic action.

Of the many agents commonly administered in the domestic ruminant for combating like disturbances, the only one we have found to be of any real value whatsoever was tannigen (acetyltannin), through the use of which we have been enabled to successfully cope with these cases.

From the excellent health of our buffalo herd during the warm months of summer, and the number of these intestinal cases reported late in the autumn and early winter, along with the benefits at once derived by corraling and feeding exclusively upon dried herds-grass, I am convinced that the disturbance had its foundation in indigestion, pure and simple, from taking frozen grasses. Although the microscopic examination of the digestive refuse from time to time showed the presence of several kinds of small worms, their inconstancy in the actually suffering would tend to disprove their pathogenic nature.

The marked tendency of these cases to assume chronicity should, I think, at all times cause us to put the animals under treatment. Not only does the impaired digestion rapidly show

itself in the animal's pelage and cause them to become unthrifty in appearance, but the attendant weakness and incompetency of such animals to withstand herd-life among vigorous companions exposes them to serious injury which, once gained, for obvious reasons can seldom receive the treatment which is extended to other animals.

Tuberculosis, the fourth disease of importance with which I have been confronted up to date, has not assumed, I am pleased to say, anything like the prevalence in our various installations which has attended the keeping of large collections of animals in this and other parts of the world.

Since all animals which die within the Park are systematically examined after death, I am in a position to report that no traces of this disease have been found in any of the various installations beyond four cases of small monkeys and one case of avine tuberculosis (eagle) in the bird collection.

Since every possible effort has and constantly is being made to avoid crowding of the collections, and to keep up a system of thorough cleansing and disinfection of all cages, and particularly those of subjects of known susceptibility, we hope for still greater immunity from this scourge, which is so truly the bane of animals in captivity. Of the cases examined, the lesions were located mainly in organs other than the respiratory, which fact greatly mitigates against rapid dissemination of the contagium.

While the above briefly summarizes the character and treatment of diseases which have in the main constituted our greatest perplexity, and have in part been more or less satisfactorily solved, much still remains to be worked out, particularly along the line of gastro-enteritis of Western ungulates.

The remaining named conditions of disease which called for treatment were, with few exceptions, such as occur in general practice among domestic animals, and have given quite as satisfactory results when treated.

ANÆSTHETICS.

It will be of special interest to those humanely as well as scientifically interested in this particular study to learn that the conduction of our surgical work among the animals, of which a goodly amount has been done, has at all times and without exception, when it was in the least degree possible, been prose-

cuted with the strictest regard to the prevention of animals suffering. The anæsthetics selected for operation were chloroform, sulphuric-ether, and cocaine according to the nature of the work to be done and the class of animal to be treated. Among the animals to undergo operations requiring general anæsthetics I would report:

1 Alligator.	1 Wolf.	3 Antelopes.
1 Crocodile.	5 Bears.	7 Monkeys.

Not only has the constant use of these agents been prompted by reasons of humanity, but along with modern antiseptics, carefully selected to meet the peculiar idiosyncrasies of various species, conditions have been easily and successfully treated which would have been quite impossible without the aid of such agents.

My frequent examinations of the food supplies for all animals within the Park have, with one or two exceptions (which were immediately corrected), showed them to be at all times highly satisfactory in quality and state of preservation.

It may not be inopportune at this time, in view of the nature of my special charge, and the tendency of our Buffalo to easily acquire digestive disturbances, to suggest that the permanent improvements of the coming year include such measures as you may think would insure a more perfect drainage of certain low-lying parts of the Buffalo Range, to the end that a more perfect grazing sward may be produced.

I would also advise the consideration of methods to regulate the manner of inflow and outflow of the various pools and ponds made use of by the animals, in order that such currents may be produced as would tend to materially check the rapid growth of algæ, etc., and render fouling less possible during the warmest weather, when the vitality of our animals is necessarily at the lowest point of the year.

The detail work of your Veterinarian has been greatly facilitated by the employment of the laboratory attendant, whose services I trust it may be your pleasure to continue. Not only have his efforts in the laboratory been very gratifying, but the service he has rendered in the capacity of dispensing and hospital steward has been highly satisfactory to me.

In closing, I wish gratefully to acknowledge the kind consideration I have at all times received at the hands of Director

Hornaday, and the support accorded my work; also the hearty co-operation and courtesy of the assistants and keepers, and their invariable interest in the animals both in and out of treatment.

Respectfully submitted,

FRANK H. MILLER, V.S.,
Veterinarian New York Zoological Park.

ANNUAL REPORT OF THE PATHOLOGIST.

BY HARLOW BROOKS, M.D.

THE period of time covered by this report extends from July, 1901, the time of my appointment by the Executive Committee on the recommendation of Professor Osborn, to January 1, 1902.

It has been impossible to make observations on all the cases of death among the animals because of insufficient facilities and lack of time. For these reasons, examinations have to a great extent been limited to those diseases of greatest frequency, or those occurring in animals of the greatest value.

The character of the studies made has often been unsatisfactory from a purely scientific stand-point, inasmuch as frequently they have, of necessity, been superficial and incomplete; for the primary object in each case has been to attain, by as direct a method as possible, the practical points which might serve us in the immediate identification, prevention, and treatment of the disease. Notwithstanding this general statement, several minor contributions have been presented by the writer before various scientific societies, and other observations and material have been so preserved as to form the basis for future studies of this character.

In this report it will be possible to consider only those diseases which we believe to be of the greatest importance.

The most frequent and the most serious disorders with which we have had to contend have been those of the *digestive tract.* This is to be expected, since such diseases are always among those most frequent, especially when large numbers, either of men or animals, are under more or less artificial conditions. For instance, note the frequence of this class of diseases as reported by the army surgeons. In the army, conditions are much less

complicated than among our animals, for in the Park we have to contend with the greatest extremes in alterations of climate and habitat, as well as to comply with the most widely varied demands in alimentation.

GASTRO-ENTERITIS AMONG THE RUMINANTS.

It is not at all unexpected, therefore, that our most serious mortality has resulted from *gastro-enteritis;* but, contrary to the ideas of the layman, this condition has been most severe and frequent in specimens of our native wild animals—notably in deer, caribou, and moose native to this country, and largely taken from climates not widely differing from that of New York.

In the most acute of these cases, those in which death occurs in from ten to thirty-six hours after the onset in animals previously healthy, the lesions are generally limited to the abomasum, or true stomach. The lesions consist of an acute injection of the submucous blood-vessels, not infrequently with smaller or larger submucous blood-extravasations. In none of these acute cases have I found ulcers, though they may be present when the process becomes subacute or chronic; generally the viscus contains a somewhat limited quantity of substance which consists of fermented food mingled with a fluid which contains many leucocytes and occasional red blood-cells. Most frequently in these cases the other cavities of the stomach are filled, or over-filled, with food which is almost invariably so much fermented that enormous gaseous distention takes place, quite frequently before death.

In those cases in which the disease has been of longer duration the process extends downward, successively involving the duodenum, jejunum, and ileum. I have seen an extension into the cavities of the false stomach in but one case; that was an extremely severe one, which occurred in a young bull-moose. The lesions which are produced in the intestine are identical with those of the stomach. As is to be expected, diarrhœa, with a very much decreased food-assimilation follows, and the animal rapidly emaciates, finally dying in a state of general exhaustion and malnutrition.

If the disease extends to the colon, dysentery follows, and at the same time the process in the stomach and small intestines becomes more and more marked, finally resulting in an atrophic

and infiltrated mucous membrane, which is unable to produce the digestive ferments or to permit of normal absorption.

In all cases where the disease has been of long standing, and sometimes in acute cases as well, the kidneys become diseased, and present typical pictures of acute exudative nephritis or, more rarely, of hæmorrhagic nephritis.

In regard to the causes of this gastro-enteritis, judging from analogous lesions occurring in the human subject (where the conditions have been most carefully studied), I have no hesitancy in pronouncing them qualitative and quantitative errors in diet. Indeed, I think we may with entire justice compare this condition occurring among our animals with the similar disease so prevalent in infant asylums and hospitals, where, in artificially fed children according to the official statistics of the German government, 51 per cent. die of a similar gastro-intestinal disorder (Winter). With our limited space and flora we can hardly hope to approach more closely the natural *self-selected* food for our ruminants than cows' milk, or artificial preparations, approach the maternal milk for the human. As a rule, I believe that the causative agent in the production of this gastro-intestinal irritation is abnormal fermentation of the food, and I have usually found that this process is most marked when the animals have fed at will on fresh food such as the grass growing in their inclosures.

I believe that better results could be attained by limiting the quantity and increasing the variety of the food, attempting to reproduce, in so far as possible, the conditions and flora under which the animals normally live. The difficulties of following out this very simple and entirely obvious suggestion can hardly be appreciated by those who have not tried it, and who fail to realize the limitations of space and possibility in these respects imposed by a park situated on the valuable land of a great city. I feel very hopeful, however, that continuation of the methods already adopted at the Park, especially that of securing young animals, in which we may reasonably look for better results in the way of natural adaptation, will finally solve this serious problem in a reasonably satisfactory way.

There is still another source of gastro-enteritis which we have to consider, and one which, owing to the firm stand already taken by the director, I believe should be practically eradicated

by next year. That is the gastro-enteritis produced by the presence of foreign bodies in the stomach. These have been given the animals by mischievous or thoughtless visitors. Three valuable specimens have died from this cause alone during the past year. One, an expensive Japanese bear, had been fed peach-stones in such quantity as to effectively block the pylorus, producing an extreme acute gastritis, with finally complete pyloric stenosis. Similarly, one of the deer had been given leaf-lead in such an amount as to set up a fatal gastro-enteritis. Director Hornaday has taken stringent measures to stop this abuse, and he should receive the assistance in this work not only of the members of the Zoological Society, but also the help and co-operation of every animal lover. The idea is all too prevalent among the public that animals can "eat anything."

DYSENTERY AMONG THE PRIMATES.

Dr. Miller has dealt quite extensively in his report with the epidemic of dysentery which occurred among the orangs, and which also affected the chimpanzee, with the result that all but one of these animals died.

Pathologically, this epidemic has been of great scientific and practical interest, inasmuch as we have been able to identify the cause of the disease, and this knowledge has enabled us, thus far at least, to save one member of the orang family.

The etiological factor of this epidemic was the *Balantidium coli (Paramœcium coli)*, a parasite belonging to the order Heterotricha.

This organism was discovered by Malmsden in 1857, in the mucous discharges of a patient who suffered from a persistent diarrhœa following cholera. It is an oval body about four to seven times the diameter of the human red blood-cell. It is completely covered by cilia, arranged in parallel rows. An ectosarc and endosarc are usually clearly shown. The mouth is funnel-shaped, much like that of the ordinary paramœcium, and is surrounded by a row of cilia which are larger than those over the organism. There is also a small anal orifice at the posterior extremity of the oval. The paranucleus is bean-shaped, and reacts diffusely to chromatic stains. The cytoplasm is granular, and contains two large vacuoles; it often incloses bacteria, red blood-cells, small granules of dirt, fat, or other material taken up from the medium surrounding the parasite.

The *Balantidium* is quite actively motile, but soon loses its motility if exposed to cold, acids, or disinfectants. Solutions of quinine, creolin, or other similar agents, apparently soon kill it unless it be encysted or protected by the tissues.

These paramœcia are found normally in the fæces of swine (Leuckhart, Stiles). In man it is present only when associated with diarrhœa or other intestinal disease (Doplein).

The pathogenicity of this infusorium is still in question. Beyond doubt it may be considered as a normal inhabitant of the intestine of the hog, as stated by Leuckhart and Salmon, but in other animals its innocence is not as clear. As mentioned above, it has been found in the human subject only when associated with diseases of the intestine, particularly after cholera or typhoid, and associated with the *Amœba coli* in tropical dysentery. I am informed that Strong, of the army, now Director of the Pathological Laboratory at Manila, states that it is undoubtedly a pathogenetic factor in the production of the dysenteries prevalent in the Philippines. The observations of this scientist should receive the most respectful attention on account of the great facilities afforded him for the study of diseases of this class and because of his previous accurate and careful work.

Experiments conducted by us seem to demonstrate that feeding by the stomach, in the lower simians, or injecting into the colon of fæces rich in living *Balantidium coli,* will not produce the disease in certain members of the monkey family. Unfortunately for the Zoological Park, however, our experience has demonstrated beyond doubt that the parasite is pathogenic to the orang and the chimpanzee.

It should be noted, as pointed out by Dr. Miller, that all the animals fell sick at the same time. Throughout the entire epidemic, after routine microscopic examinations of the stools had been instituted, it was clearly shown that the degree of diarrhœa present and the severity of the general symptoms corresponded with the number and activity of the parasites found in the fæces.

Disinfectant enema caused a retardation or cessation of movement in the organism, and was followed by amelioration of the symptoms.

Concerning the lesions produced by the *Balantidium coli* in the higher primates, I can perhaps best illustrate from the somewhat voluminous protocols of the examinations conducted upon the orangs and chimpanzee, which died from the disease.

In these animals all the viscera except the colon were free from gross lesions, but in each instance the body showed many indications of the profound exhaustion which terminated the disease. Microscopic examination of the heart showed an acute fatty degeneration of the myocardium; the liver and kidneys exhibited the same pronounced change.

The mucosa of the stomach and small intestine, though partaking somewhat of the general anæmic condition, were practically normal, and the small amount of food found in these tubes was apparently in a natural condition of digestion. In the lower part of the ilium fairly well-formed fecal masses were found; but, beginning with the caput coli, the conditions were entirely changed, and the fæces were very fluid, flecked with blood, mucus, and pus, and of a very foul odor.

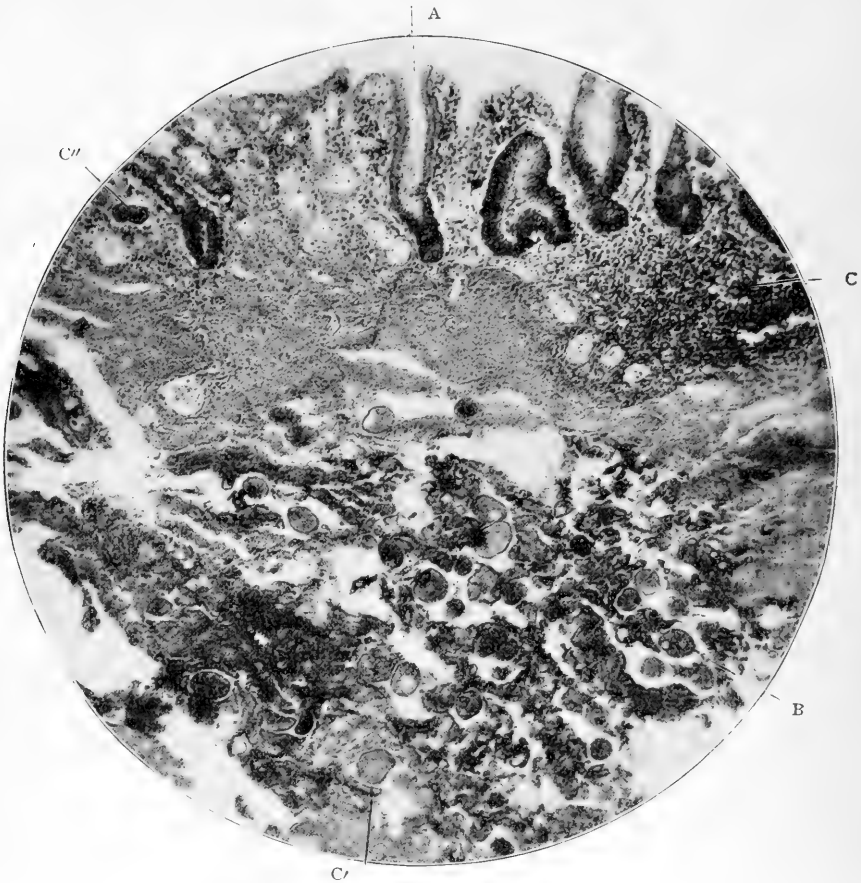
In the most severe case, that of "Rajah," the entire mucosa of the colon was transformed into an almost continuous succession of large irregular ulcers. The ulcers showed raised, œdematous, undermined borders. The bases of the ulcers were made up of a dark sloughing tissue, and a good many extended down to the peritoneum; and, though none had macroscopically perforated, the peritoneal surface of that portion of the gut was covered with a recent septic exudate.

Microscopic examination of sections of these ulcers showed myriads of the parasites burrowing beneath the mucous membrane, even along the lymphatic channels of the muscle coat and, in places, as far down as the peritoneum. In some areas the parasite was so abundant as to almost completely fill the field, obscuring or displacing the tissues.

Sections of mucosa, intervening between the ulcerations, showed frequent *Balantidia* on the free surface, and small colonies of from two to six or eight in the dilated bases of the crypts of Lieberkühn.

The protoplasm of many of the parasites contained frequent blood and epithelial cells, as well as detritus and numerous bacteria. Needless to say, the floors and sides of all the ulcers showed bacterial infiltration, and the adenoid tissue was everywhere much inflamed.

In the case of "Brunei," healing had begun in many of the ulcers, and these were not as frequent as in the other animals. The parasites were less numerous, and apparently the animal



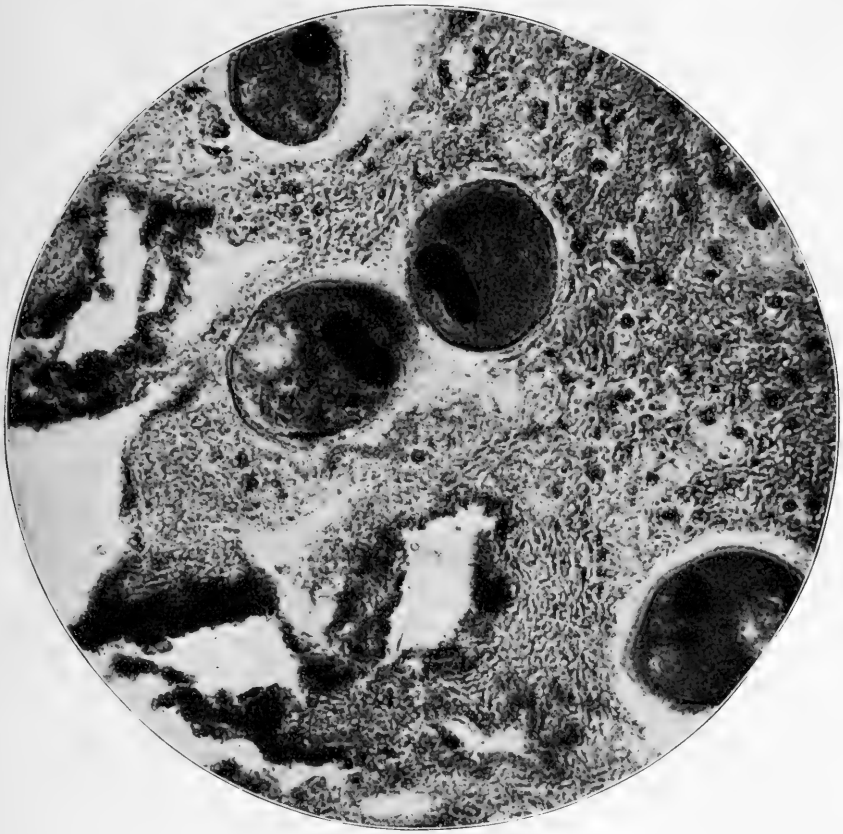
BALANTIDIUM COLI IN AN ORANG-UTAN.

A micro-photograph, magnification, 94.5 diameters: section through ulcer of colon, showing the undermined character of the ulcerations, and the presence of numerous *Balantidia coli* in the submucosa. A, intestinal gland; B, inflamed follicle; C C′ C″, *Balantidia coli*.

had died from exhaustion and malnutrition consequent upon the ulcerative colitis.

In the colon of "Sultan," who recovered from the first epidemic but died from a subsequent attack, only a few recent ulcerations were found, but the mucosa of the colon was almost obliterated from the contraction of the scars resulting from the former attack. In the recent ulcerations, and in the dilated crypts, the *Balantidium coli* was found, as in the other cases.

The colon of the chimpanzee showed a marked general atrophy of the mucosa resulting from healing of previous ulcer-



BALANTIDIUM COLI IN AN ORANG-UTAN.

A micro-photograph, magnification 850 diameters, showing the presence of the parasites in the muscular coat of the large intestine.

ations and from chronic irritation. Most of the glands were destroyed, but in those remaining the parasite was found, surrounded by many evidences of a chronic inflammatory process.

The last two cases show the great difficulty, perhaps the impossibility, of ridding the colon of this parasite. Undoubtedly all such cases will be subject to returns of the attack when any slight gastero-intestinal irritation is set up. This was proven to be the case with Sally, but, so far, careful watching and prompt treatment have kept her alive; but eternal vigilance will be the price of Sally.

It is of great importance to ascertain the origin of this infection, and the method of its introduction into the park.

First, we must consider the possibility of this parasite being a normal inhabitant of the colon of these animals, as in the pig and dog. But in the numerous examinations of fæces of monkeys made at the Park, as yet we have not found the organism except in the sick animals mentioned above.

Undoubtedly the disease first declared itself in the chimpanzee, and it is possible that the food or drink of the orang became contaminated by the fæces of this animal, or of some other animal in which the *balantidium* may occur normally. Very recently Mr. Ditmars and Mr. Deaken have found the living parasites plentifully in the fæces of the large land-turtles. Probably they are normal inhabitants of the intestine of these animals. For a time the orangs were quartered in an outdoor inclosure close to one tenanted by these turtles, and their infection may have taken place through this avenue. If this has been the mode of infection, I feel certain that it will not again happen after the very strict precautions to prevent such contamination that are now taken at the Park.

DISEASES OF THE LUNGS: TUBERCULOSIS.

Tuberculosis, which is usually the cause of a large per cent. of the deaths in colonies of either men or animals, has played a very unimportant part with us. A few minor animals have died with this disease, but as soon as it was detected they were either killed or otherwise placed beyond the possibility of infecting others. We point with great pride to the fact that, among the animals that have died from various other diseases, none were found to be also infected with tuberculosis.

This favorable state of affairs is undoubtedly due, first, to careful selection of healthy animals; second, to the thoroughly cleanly conditions under which the animals are kept, and the frequent use of disinfectants; third, the quarantining of sick animals, and the early and thoroughly scientific treatment. If our records are to show freedom of tuberculosis in the future, these same wise provisions must be followed. In this particular the recently established laboratory should greatly aid, since it presents the possibility of early and absolute diagnosis of this condition.

INFECTION.

We have been almost equally fortunate with other *contagious infections.* But quite recently a very fatal one has broken out among the quail. Bacteriological examination has shown the infective agent to be a member of the Proteus group of bacteria. Quarantining the sick birds and a thorough disinfection of their quarters will probably prevent the spread of this very common fowl disease.

Some study has been put upon the subject of an infectious process affecting the gums and buccal mucosa of certain reptiles, causing the formation of a necrotic membrane, and the production of exuberant granulations about the fangs of these animals. The probable cause of the disease has been identified as a bacillus which occasionally becomes distributed throughout the blood, producing a septic condition with the formation of multiple infarctions. One of the large pythons died from this disease, and at post-mortem the gross lesions produced were found to resemble very closely those of tuberculosis. Careful bacteriological examination eliminated this possibility. In a recent number of a medical journal, a case of tuberculosis is reported in a python in Chicago. I question the possibility of a true tuberculosis in an animal of so low a normal temperature, and, unless microscopic and bacteriological examination corroborated this diagnosis, I should infer that the disease was identical with that studied by us.

PARASITES.

Naturally, diseased conditions produced by other parasites have been common, though as a rule rarely fatal, and this has been the subject of a good many observations, though the field has been by no means covered on account of an over-abundance of material.

The average animal which dies at the Park contains intestinal parasites, and sometimes several varieties are present in a single animal. The most common forms found are various tænia and nematodes. No particular study has been made upon these forms.

Numerous examples of the strongyloides intestinalis were found in the diarrhœal discharge of one of the buffalo, and in the opinion of Dr. Miller this parasite very likely acted as one of the etiological factors of the diarrhœa.

Other members of the strongylus group have been frequently found, particularly in the bronchi of members of the deer family. In one case, that of a mule deer, it is possible that this condition produced fatal broncho-pneumonia.

Cysticerci have been frequently found in various animals and invading nearly every viscus, but apparently they have not caused death in any case.

A rather extensive study has been made of an instance of the Mischerschen schleuche, which was found in the myocardium of an elk, where it clearly caused death—a rather unusual occurrence with this ordinarily innocent parasite. A communication concerning this study was presented before the New York Pathological Society. Pfeiffer concludes from his experiments with this sarcosporidien that animals will not become infected from eating muscle containing it, and Ostertag recommends that in the inspection of meat for human food, that flesh containing this parasite need not be rejected unless the muscle-tissue itself be secondarily diseased. This is a matter of great importance, since the parasite is very frequent in the muscles of sheep, deer, and other animals used for food. The parasite has been found in the human a few times (Kartulis, Barbaran, and St. Remey, Rosenberg, and Lindermann). It is probably more frequent in the human than these few examples indicate. In my opinion, meat which contains them should never be used either for animal or human food unless the meat be thoroughly cooked. The work of Theobald Smith, in the November (1901) number of the *Journal of Experimental Medicine,* bears me out in insisting on this precaution, for he has systematically infected mice by feeding them muscle containing this parasite.

Other forms of parasitic diseases have also occurred at the Park among the birds and carnivora, but these cases have not come under my personal observation.

SUGGESTIONS.

I have very little to offer at this time in the way of *recommendations,* for the reason that in the past such few suggestions as have been proposed by me have been so quickly and efficiently put into practice.

I am particularly desirous of seeing the Park animals put under as nearly perfect hygienic conditions as exist in human hos-

pitals or barracks, and this condition now pertains to a large degree in the New York Zoological Park. There are, however, faults in the construction of quarters, particularly in temporary buildings, which render disinfection difficult and proper cleanliness impossible. It is useless to specify, for we are aware of these flaws, and in the building of future quarters they will not occur.

I ask a wider scope for the laboratory work in the Park. We must have further facilities for the examination of blood, fæces, and particularly of bacteriological cultures. We feel that these methods will yield just as valuable and practical results in the Zoological Park as they do in human hospitals, where we now recognize them as indispensable. We must have reagents and apparatus for the gross and microscopic examination of all diseased tissues, and we must preserve in a properly conducted museum such preparations as are of practical or scientific bearing on the study of the diseases of animals.

A library comprising the chief works on veterinary medicine, comparative anatomy, pathology, and bacteriology should be furnished, and the best journals on these subjects should be subscribed for in order that the curators, keepers, and all connected with the Park may become well informed on all branches pertaining to the care of the animals.

A system of preservation of the records of this department is now being perfected, and it is to be hoped that these, taken in conjunction with those of the other departments, may prove of real scientific as well as practical value not only to ourselves, but also to all interested in the study and care of animals.

In conclusion, I wish to thank the President and Board of Managers for their generosity in providing facilities for our work, and for their enthusiastic support. We are also indebted to Professor E. K. Dunham, of Carnegie Laboratory, and others for loaning us apparatus and material for our impromptu laboratory, which we hope to replace soon with a thoroughly equipped establishment, a permanent addition to the Park.

Finally, I wish to personally thank Director Hornaday for his interest in this department and for his thorough co-operation.

Respectfully submitted,

HARLOW BROOKS, M.D.,
Pathologist.

THE GIANT TORTOISES.

By RAYMOND L. DITMARS,

ASSISTANT CURATOR, IN CHARGE OF REPTILES.

ON July 16, 1901, five giant tortoises, purchased in Boston from Mr. Frank B. Webster, arrived at the Zoological Park. These specimens cost the New York Zoological Society $1,000, and their installation not only placed the Park in possession of a fine exhibit of these eccentric reptiles, but also of one of the largest and oldest specimens now in captivity.

As the survivors of an age when reptiles attained colossal proportions, the giant tortoises alive to-day have witnessed many changes in the animal life of our planet. Successive generations of them have lived through the periods when an atmosphere reeking with humidity drew forth luxuriant vegetation, upon which browsed the great herbivorous lizards, and which eventually gave way to the fauna of the present time. With the passing of innumerable centuries, race after race of reptilian monsters degenerated and perished. Their fossil remains, so gigantic in character as to stagger human imagination, are illustrations of the period when reptilian life was in its prime. With the exception of the giant tortoises, which, through some strange provision of

Nature, have survived to the present day, and the crocodilians, the reptiles of to-day, when compared with their gigantic ancestors, are insignificant creatures.

There are fourteen distinct species of giant tortoises. Six of these inhabit the Galapagos Islands in the Pacific Ocean. Four are found on the Aldabra Islands in the Indian Ocean, and four inhabit the Mauritius-Rodriguez group of islands. All the species are rapidly becoming extinct, and reputable scientific authorities have declared that several species have disappeared during the present century. On the continents of Europe, Asia, and Africa these creatures are represented only by fossil remains.

Of the giant tortoises now in captivity, all save a very few have been obtained from the Galapagos Islands. This archipelago is situated on the equator, about five hundred miles west of the coast of South America, and belongs to Ecuador. The islands are thirteen in number, and all are of volcanic origin. The largest and most important are Albemarle, Indefatigable, Chatham, Charles, James, Narborough, Hood, Barrington, Bindloes, and Abingdon Islands.

During the past ten years a number of expeditions have visited the islands for the purpose of procuring tortoises. The first expedition resulting in the arrival of tortoises in this country, was made by the United States ship *Albatross,* which touched at the islands in 1888. Eighteen specimens were procured, and shipped to Washington, D. C. Long prior to the visit of the *Albatross,* however, the United States ship *Essex* explored the islands of the Galapagos group in 1812. Two large tortoises were captured. They were presented to a South Sea Island chief. In 1898 these same tortoises were secured by the Hon. Walter Rothschild, and shipped to London, where they now are.

In 1897 Mr. Rothschild arranged an expedition to the Galapagos Islands for giant tortoises. The total expenses for this expedition were $15,500. Fifty-nine tortoises were captured, but none exceeded two hundred pounds in weight. All the islands were visited. On Duncan Island twenty-seven specimens were captured, representing a species known technically as *Testudo ephippium.* The collection reached London in 1898, and figured as a special exhibit in the Zoological Conference then in progress. They were finally distributed by their owner among the zoological gardens of Europe.

In 1900, twenty tortoises from the Galapagos Islands were landed in San Francisco for Mr. Rothschild, and shipped to London *via* Boston. The trip to Boston proved disastrous to the collection, for only six specimens reached Boston alive. These comprised specimens of *Testudo vicina* and *microphyes.*

The third and by far the finest lot of these reptiles arrived in San Francisco during the early part of 1901. They were brought by the schooner owned by Captain William Johnson. Three of the tortoises in this shipment were the largest ever captured, weighing over three hundred pounds each. Mr. F. B. Webster, of Boston, purchased this entire lot of reptiles. Two of them died in San Francisco, and one died a short time after reaching Mr. Webster's place at Hyde Park. One of the three largest specimens was purchased by the New York Zoological Society, together with four others. Six specimens were purchased by Mr. Rothschild; two were sold to Count Peracca, in Italy, and the remainder were disposed of among zoological institutions.

Although the last expedition to the Galapagos Islands claimed to have placed the last survivors of the race in captivity, it seems reasonable to believe that in the interior of the larger islands, concealed by the vegetation and the rugged inequalities of that volcanic country, a substantial number of the monster tortoises yet exist.

From observations made in the East Indies and in zoological gardens of Europe, wherein giant tortoises have been exhibited, they seem to attain the most astonishing ages. Many records demonstrate that a century constitutes but a fraction of the tortoise's existence. Few are better able to speak upon this subject than Mr. Rothschild, who has made a special study of the creatures. The following is a portion of a letter from Mr. F. B. Webster quoting Mr. Rothschild's views concerning the age of a specimen which seems to be younger than the largest in the Zoological Park collection:

"You may be interested to know what Mr. Rothschild says about the tortoises. You will remember I told you that, in my opinion, the ages of Nos. 1, 2, 3, 4, and 5 was about three hundred and fifty years each. There could be no great difference between them, although Nos. 4 and 5 looked the oldest. Now No. 1 was sent to Mr. Rothschild. While it was the largest, its shell did not show quite the age of the others. Its size and general appearance, however, indicated that it had lived in a smoother sec-

LARGEST GIANT TORTOISE IN THE ZOOLOGICAL PARK.

Weight, 310 pounds. Age, about 400 years.

tion, where it had not done so much rock-climbing. Mr. Rothschild says: 'I think No. 1 *must be at least four hundred years old.*' Now you can safely call No. 5 (the largest specimen in your Park) at least four hundred years old on the best authority."

Incidental to Mr. Webster's letter, it might be explained that the tortoises were numbered when collected, and these numbers have been used as originally bestowed.

The five specimens arrived at the Zoological Park in box crates, and were placed in a large open-air inclosure in front of the Reptile House. On the shell of each was painted in large white figures the number by which it had been designated for sale. The specimens were immediately weighed and measured, in order that their growth in size and weight might be noted from year to year.

The next step was to photograph each specimen. During the process of picture-taking the reptiles were allowed their freedom on the lawn in front of the Reptile House. They were nowise embarrassed by the work of Mr. Sanborn, the Park photographer, and grazed with great energy on the luxuriant blue grass and clover. Scattered as they were over the grassy field, their huge shells glistening in the sunlight and moving ponderously, their appearance at once suggested the efforts of palæontologists to restore the weird landscapes of the Pliocene Age. This effect was still further heightened by the occasional stretching of a head and neck, two feet or more, as a tortoise surveyed its surroundings with slowly blinking eyes.

With much difficulty the specimens were weighed, and the figures obtained were as follows: No. 5, *Testudo vicina,* 310 lbs.; No. 11, *T. vicina,* 156 lbs.; No. 13, *T. vicina,* 129 lbs.; No. 21, *T. ephippium,* 118 lbs.; and No. 17, *T. nigrita,* 66 lbs. The dimensions of the largest specimen were found to be as follows: Length of shell on curve, 4 feet 3 inches; width on curve, 4 feet 7½ inches; height, 20 inches. By way of comparison, it may be stated that the average weight of our common gopher tortoise when fully mature, is about fifteen pounds. This is the largest species of American tortoise.

Not many days after the tortoises were installed, they seemed perfectly at home. Owing to the surprising amount of activity they displayed, they were fed daily. All day long, with deliberate stride, the big fellows roamed about their inclosure, assembling every morning to feed greedily upon the piles of green food sup-

plied by their keeper. As sunset drew near they invariably retired to their favorite corner, where plenty of hay had been provided as bedding, in which they would burrow until nothing but the tops of their shells could be seen. Long before sunrise they were alert and on the move. During the day the larger of the tortoises developed the peculiar habit of making a wallow in the soft ground near the drinking-tank. By turning slowly around in the soft soil a number of times, the ground was converted into mud, in which he lay with seeming satisfaction. This appeared to be, for a tortoise, a peculiar characteristic, because these reptiles usually dislike damp situations, and in most cases inhabit the driest ground available.

Beyond question, it was while the tortoises were exhibited in this yard, in the center of which stood the large open-air cages of the five orang-utans, that the reptiles communicated to the apes the living *Balantidium coli,* described in the report of Dr. Harlow Brooks, which in October caused the death of four of the orangs.

On days when the Park was particularly crowded, and visitors flocked about the rail of the tortoise inclosure, the reptiles appeared to take a real interest in the crowd, and went stalking about with necks outstretched, crushing disdainfully under their club-like feet the peanuts and candies thrown to them in a spirit of ignorant kindness.

Sometimes, though at rare intervals, disagreements would arise among them. These were settled in combats as ponderous as they were harmless to the combatants, each of which would retire with an air of profound satisfaction over the result. These exhibitions of temper usually occurred while their keeper was preparing the morning's meal and placing the green vegetables and melons in the big trays from which they fed. Two of the reptiles would suddenly arise to the full limit of their stubby limbs, and then snap at each other. Their horny, sharp-edged jaws generally rasped harmlessly against shelly armor; and, after repeating this performance several times, the march to the feed trays would begin. During these absurd fights the limbs of the reptiles, stretched to their utmost limit, recalled the similarity of these members to the corresponding parts of a small elephant; and possibly it is from this resemblance that the group is sometimes known as the " elephant tortoises." The most astonishing feature of these tortoise fights was the last. After these combats, one or

the other of the participants sometimes trumpeted in loud, shrill fashion.

Since their arrival at the Park the tortoises have been fed liberally on green food, which they eat greedily. Their bill of fare has been exceedingly varied in character, changing according to different products in season. From the time of their arrival in July up to December 31st they consumed over three thousand pounds of vegetables and fruit. This consisted during the summer months of watermelons, muskmelons, bananas, tomatoes, squashes, cabbages, carrots, lettuce, beet tops and corn tops; during the fall and winter months they are given pumpkins, squash, lettuce, celery, chickory, carrots, and cabbage. This list is exclusive of the large quantities of grass given them during the summer.

When the tortoises arrived at the Park, the largest specimen, christened " Buster," was weak and inactive. He could get about only by dragging his heavy shell along the ground, a few feet at a time, and then resting before going farther. At first the writer was led to believe that the specimen was too old and feeble to raise his heavy shell clear from the ground and move about with the agility of his associates. But this belief, happily, was found to be incorrect. Upon a diet of luxuriant meadow-grass and clover, together with melons and the like, " Buster " grew steadily stronger, and in the autumn it was noticed that he began to move about, like his younger companions.

When pumpkins came in season and were offered, the reptiles attacked them with enthusiasm. So fond were they of this vegetable, that the arrival of the feed-cart containing them was the signal for the gathering of " Buster " and his companions around their keeper, the five pairs of beady, black eyes following every motion as the pumpkins were cut in halves and laid in the heavy trays.

As an instance of reptilian appetite, it may be interesting to explain, that during the summer months, " Buster," unaided, usually consumed two large watermelons at a meal, not a vestige of the melons being left uneaten. At each mouthful of the succulent fruit the reptile's mouth would stream with the juices. Oddly enough the big fellows appeared after a meal of this kind, their heads and feet plentifully besmeared with remnants of the feast, as with an air of profound satisfaction they lay quietly blinking

and dozing in the patches of sunshine filtering through the foliage over their corral.

Although tortoises are ordinarily credited with no great amount of intelligence, the specimens in the Park evinced anything but stupidity. The manner in which they regularly retired to the bedded corner of their corral and fastidiously settled themselves in the hay, the eagerness assumed as they watched their keeper prepare the daily meal, showing their impatience by occasionally taking choice morsels from his hand—all showed that their reasoning powers are not wholly void.

Although a water-tank constantly filled was kept in the tortoise yard, the reptiles drank at very irregular intervals. The largest specimen was several times observed to drink at one time quantities estimated at from eight to ten quarts, but his visits to the drinking-tank were seldom more frequent than once or twice a week. The anatomy of these creatures provides a reservoir for the storage of water, and when this is filled, the fluid is slowly consumed as needed.

During the latter part of the summer, when cool nights rendered it inadvisable to leave the reptiles outdoors after sunset, they were lifted upon a hand-truck, each specimen constituting a load, and transported to the east wing of the Reptile House, whence they were taken to their yard again in the morning. They strenuously objected to being lifted upon the truck, using their huge feet with vigor in their endeavors to prevent the men from lifting them. It required five men, employing their full strength, to lift the indignant "Buster" aboard the truck, where he puffed and snorted with a degree of energy proportionate to his size.

In the east wing of the Reptile House, the future home of all our tortoises, is a platform mounted by two steps. Up these steps to the platform and down again to the floor, with never a slip or tumble, the giant tortoises climbed without difficulty, illustrating the strength of limb with which Nature endowed them for traversing the volcanic and upheaved surface of the Galapagos Islands. It was upon this platform that they generally settled down for the night, with heads and feet drawn in, looking much like an assembly of cold, inanimate boulders.

With the approach of cold weather the tortoises were taken to the Elk House, and placed in the large west room. This is heated by two large stoves, around which they cluster socially, and doze away the intervals between feeding hours.

GIANT TORTOISES IN COMPARISON WITH A TESTUDO OF AVERAGE SIZE

Not long after placing the collection in the Elk House, one of the reptiles injured a hind foot, and was seized with symptoms resembling blood-poisoning. The limb swelled considerably, and became entirely useless. Presently this condition affected the other hind limb. The tortoise lost all desire for food, and seemed to suffer some pain. It was unable to move about, except by dragging itself along slowly with its front feet.

Vigorous measures were then adopted. The wound was enlarged, washed with antiseptics, and dressed daily. A week's treatment was followed with very gratifying results. The swelling subsided, the wound was permitted to heal, and the animal recovered its appetite. Among captive animals which have been indisposed, the latter symptom is always regarded as highly favorable. Within two weeks after receiving the injury the reptile had entirely recovered.

Taking into consideration the fact that, with the exception of the largest member of this colony, the giant tortoises in the Zoological Park are comparatively young individuals, there is reason both to hope and believe that some of them will continue to be residents of the Park long after the present human generation has passed away. Even when another century of time has passed, there should remain several members of our tortoise herd, each one considerably younger than their present patriarch is to-day. If they do thus survive in the year 2000, they will represent the birth and development of this institution, and probably will be the only creatures which have lived through from the period when anticipations of great developments and the subsequent realization of the same, one by one, marked the beginning, growth, and final completion of the New York Zoological Park.

SUCCESS OF THE INDOOR FLYING CAGE.

BY C. WILLIAM BEEBE,

ASSISTANT CURATOR, IN CHARGE OF BIRDS.

THERE has always been a class of people to whom a caged bird, no matter how happy and songful it appears, is a pathetic sight, and the phrase "winged prisoner" is a favorite exclamation indiscriminately applied. While there have undoubtedly been and still are abuses due to ignorance or neglect, birds which appear from their song or activity to be contented and happy really are so, for birds are free from hypocrisy.

Referring only to zoological gardens and parks, it has been usually the custom to keep birds in comparatively small cages, each species by itself, in preference to turning many species into a large indoor cage wherein room to fly and run might mean to them all that the word "palace" when compared to "cell" suggests to a human mind. In the Aquatic Bird-House of the New York Zoological Park the idea of an indoor flying-cage for large birds has received its first practical test, and as the idea was original with the New York Zoological Society, the experiment seems of sufficient importance to be reported upon in detail.

Before discussing advantages and objections, it may be said that the cage has proven an unqualified success, and not only has it equalled, but, in many ways, it has exceeded the expectations which influenced its trial. The cage in the Aquatic Birds' House of the New York Zoological Park measures sixteen by forty feet, and is twenty feet in height. The wire-work consists of chain-netting, of No. 12 wire and 2-inch mesh, set in channel-iron

frames. The wire was galvanized to prevent rust, but has been painted dull black to render it as inconspicuous as possible.

The floor of the cage contains a central pool of water, about ten by eighteen feet, fed by a central fountain. The remainder of the floor-space is covered with coarse sand to a depth of two inches.

In lieu of straight, unlovely perches, old cedar logs and trees have been utilized with very satisfactory results. The various-sized branches are adapted to the grasp of birds' feet of all sizes, and their hard, smooth surface is as easily cleaned as metal.

The following are the more important of the objections, real or apparent, which naturally suggest themselves in considering a cage of this character: difficulty in the identification of the birds by visitors; the danger of certain species obtaining food intended for others; the risk of timid species not getting their share of food; the mortality from fights between different species, and the reduced chance of the various birds breeding.

Among the more important of the advantages which have been apparent, and which in fact must accrue to such a radical innovation in the keeping of birds indoors, before it can be considered a success, may be mentioned the following, stated in the order of their importance:

I. The health and contentment of the birds.
II. Economy of room.
III. Economy of labor in cleaning and feeding.
IV. Added interest and pleasure to visitors.
V. Æsthetic effect of diverse forms and colors, and of general activity through mixed association.

The objection regarding difficulty in identification is easily done away with, and, instead of being a permanent drawback, proves to be an important factor in favor of such cages. The confusion naturally arising from the mingling of twenty-five or thirty species of birds in one cage is obviated by small but perfectly diagnostic hand-paintings of the various species, one on each label, together with the common and scientific names and the habitat. It has been noted with much interest that the identification of the birds from the picture-labels suggests itself to visitors, especially young people, as a natural-history puzzle, or game; and the comparison of bird and portrait, and the settling of doubts as to species somewhat resembling each other, affords an amusement in

the pursuit of which more knowledge of birds is obtained than would be gained in passing a series of single cages of inactive birds without picture-labels. Groups of children have been noticed again and again spending a half hour around the cage, and declaring to each other they would not leave the building until every bird represented on the labels had been found. The ingenious way which many species have of concealing themselves, by crowding close to the tree-trunks or sleeping beside a fallen log, often taxes a child's powers of observation not a little. Like "Alice's" living chess-men, this is an animated, life-sized puzzle, and the enjoyment to be found in solving it is not confined to children.

Seasonal moults or sexual differences in color often cause a certain bird to appear somewhat unlike the typical specimen represented on the picture-label, and this leads to many appeals to the Assistant Curator and keepers for additional information; and woe to the attendants if a certain species is removed from the cage unless the label is taken down at the same time. It is wonderful how quickly some person, who may look as indifferent as if he hardly knew a crow from a cassowary, will ask for the missing bird. Even with this elaborate labeling, occasionally there are people who will stand directly under the twenty or thirty paintings, point to a glossy ibis, and ask, "Is that an ibex?" But the majority of the visitors, young and old, enjoy identifying the various birds for themselves.

The objection that the necessity of placing so many kinds of food in the cage must result in certain birds getting food not intended for them, is more apparent than real. This, and the fear that the timid species will not obtain their share, is proven to have no serious foundation. As a rule, birds are very sensible beings, and, when suitable food is obtainable, do not touch that foreign to their legitimate diet. As to the second consideration, the birds confined in the large cage have so adjusted their interrelations, that there is perfect reciprocity as regards feeding, bathing, and the other privileges, even between the most vicious egrets and the most defenceless ducks. The deaths which have resulted from fights between different species will be spoken of in detail farther on.

It is true that in a large indoor cage, such as that which forms the subject of these notes, breeding is almost an impossibility, but

PHOTO BY C. W. BEEBE.

PICTURE LABEL.

it must be remembered that this cage is used for a large number of birds in winter only—a non-breeding season. However, even indoors, the magpies in the flying-cage have built nests and laid eggs, and were not molested. In spring all of the birds are placed in the immense outdoor Flying Cage, where every facility is offered to induce them to breed.

To appreciate the test which the large indoor cage has successfully stood for two years, a few of the birds living in it will be mentioned, and their diversity in habits and food will indicate the remarkable degree in which the dispositions of these birds have changed to enable them to live in intimate and friendly relations with species with which in a wild state they would never associate.

On the topmost boughs of the cedar-trees the wood ibises are generally balancing their ungainly forms, while near by are the favorite perches of night herons, little blue herons, and also the cormorants, when they are not taking their turn in the pool and swimming from end to end under the water. At times the brown pelicans dispute the possession of the topmost branches, but generally are contented to perch on lower perches in company with the American and snowy egrets and Louisiana herons. About half way to the top of the tree are branches regularly engaged by mandarin and wood ducks, and they are seldom disturbed when in possession of these favorite perches. Possibly the

larger birds found that limbs close overhead made comfortable roosting there impossible, and so the smaller tree-perching ducks occupied these unused places.

Despite their name and natural habits, the so-called "tree-ducks"—Java and black-bellied—are never seen above the ground. The various ibises—glossy, white, and scarlet—spend much of their time, as is their wont when wild, along the edge of the water probing for small particles of food. The sheldrakes, ring-billed and laughing gulls, white pelicans, coots, black swans, and the flock of flamingoes (two species) are of course altogether terrestrial, although, in comparison to the short-legged ducks, the stilted flamingoes occupy a different stratum of air. Of course only the *favorite* relative positions have been meant, as every hour, every minute in the day, shows changes due to the healthy activity of the birds.

I. The Health and Contentment of the Birds.—For the satisfactory exhibition of birds certain conditions are necessary, and their health is, without question, the most important. To be kept in perfect health, birds in captivity must of course have suitable food, but equally necessary, almost, is the need of exercise. In the New York Zoological Park it has been proven again and again that a bird may have an abundance of good food and water, and yet die in a short time from gout, from excess of fat, or other diseases consequent to a sedentary life. Give it any inducement to activity, even such as a more or less antagonistic species which keeps annoying it, and it will improve. The large cage in the Aquatic Birds' House has gained the reputation of a veritable sanitarium for birds. When a bird is moping in one of the side cages, it is removed and placed with the eighty-odd individuals in the large central cage. One of several things happens. Once, in the case of the snake-birds, a disposition was manifested entirely different from that of all other birds which have since been tested. It is impossible for this species to be confined with other birds. They manifest fiendish delight in picking out the eyes of other birds, or killing them in other ways, and so far as the flying cage is concerned they are a complete failure. Happily, the snake-birds are exceptional among all the birds which have so far come into possession of the Zoological Society, and the interest attaching to their feats of diving after live fish in their tank partly compensates for their ugly tempers.

Occasionally when an ailing bird is introduced in the flying cage, it is killed by the other inmates, but in every such case it has been found that the murdered bird was afflicted with some undiscovered disease, sometimes contagious, and therefore its death was a benefit, rather than a loss. Thus, not infrequently, unavoidable mistakes have been corrected by the birds themselves. In the great majority of the cases wherein a drooping bird is placed with the others, the newcomer continues to droop until some resident individual finds the stranger in its way, when a sound peck administered on its back gives a hint to move on. The bird either does so or resents the blow, when a little harmless sparring takes place. Usually in a wonderfully short time the new inmate is flying around, feeding and bathing with the others, and in less than a week is fit to take up its life in its own cage.

In such cases as the above recovery is not difficult to understand, but in others it is, as yet, inexplicable. In other cages a number of valuable birds have been lost from the ravages of a parasitic mite beneath the skin of the breast, which increases in number until thousands are sometimes found in one bird. In some unknown way, before the successful eradication of this pest was worked out, it spread from cage to cage and even across the Bird House, but yet not one death from this cause has occurred in the sanitarium.

Deaths from conflicts between residents of the large cage are very infrequent, many times fewer than in the cages where four or five individuals of the same species are confined. No matter how bitter may be the feeling against an individual bird, give it room to escape by running or flying, and the animosity is soon forgotten. In a small cage, however, where it is continually in sight of the bullying bird, if not removed speedily, its death is merely a matter of a few days.

The "sanitarium" appears to exert a salutary effect on the minds as well as the bodies of its patients. In their own cage the American egrets fought until three of their number were hardly able to rise from the ground. All were at once transferred to the flying cage, where the wounded birds soon recovered, and, although all have been allowed to remain, not an egretine voice has been heard raised in anger since that day.

Referring to the matter of indiscriminate feeding, it has seemed that the occasional nibble which the tree-ducks take at the her-

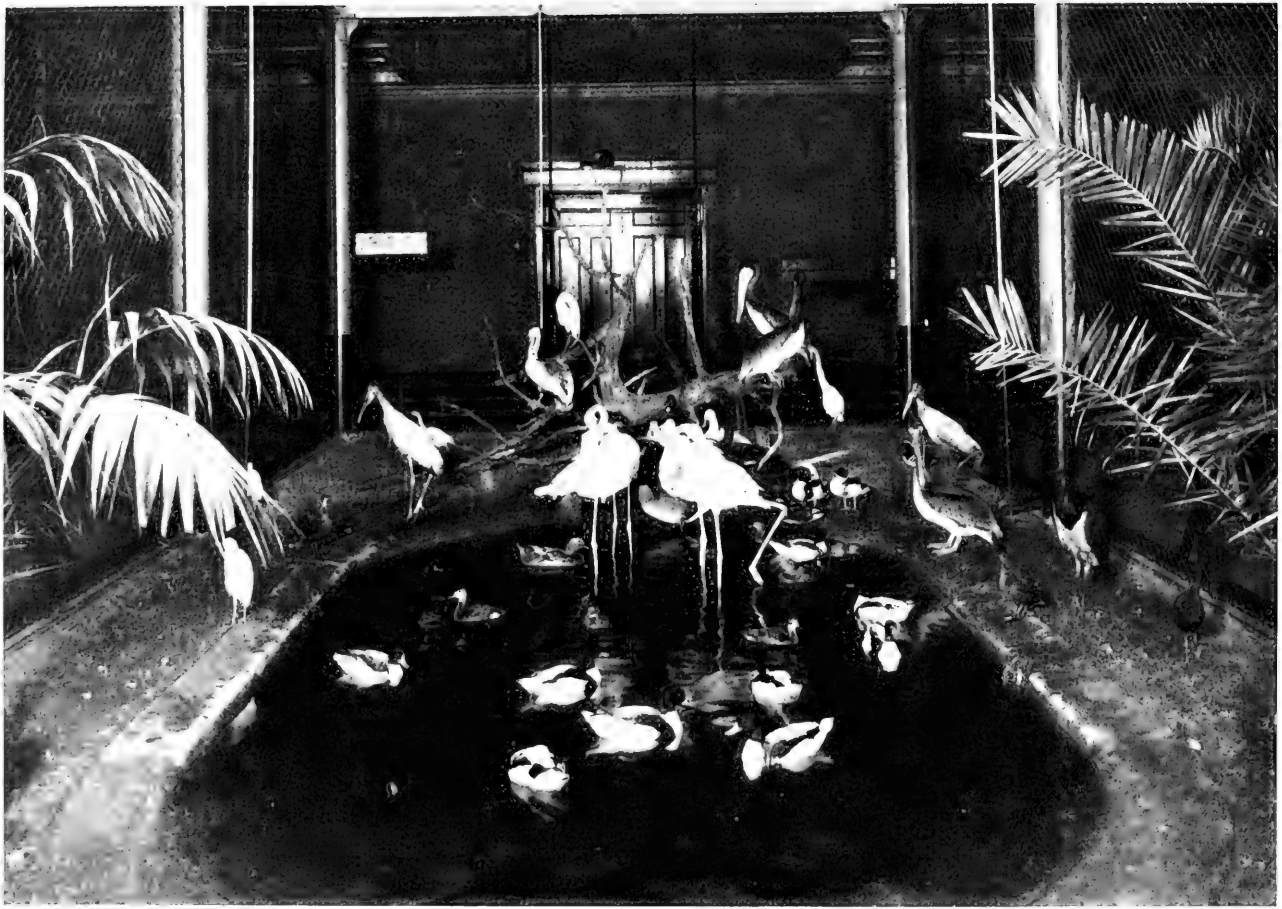
on's fish, or the small amount of grain which the ibises pick up, instead of causing any harmful results, really is beneficial in giving variety of diet.

II. and III. Economy of Room and of Labor in Cleaning and Feeding.—A factor second only in importance to the health and contentment of the birds is the facility and dispatch with which the necessary cleaning and feeding may be accomplished; and this is altogether in favor of cages like the one under consideration. Keeper Gannon reports that, owing to the generous water-supply, ample room in which to move about, and for other reasons, the large center cage of the Bird House requires only about as much work to clean as three of the side cages, but its capacity for accommodating birds is equal to twenty of the others!

IV. Added Interest to Visitors.—Viewing the results of this cage from the stand-point of the visitor, its greatest advantage lies in the fascinating spectacle it presents of life in an avian republic—a life governed by intricate laws and precedents; which are more democratic and binding than anyone not seeing daily in evidence would be led to suppose could exist. If the mere identification of the birds is enjoyable, how much more so is the exhibition of new traits and characteristics, of casual encounters, of laughable by-plays, and the remarkable intelligence shown by some of the birds, all so generally absent from the "single-species" cage. One could write of this phase of the subject indefinitely, but the constantly changing life of this interesting community must be seen and watched to be appreciated.

A bird "taking its turn" at bathing was spoken of; and this is not a meaningless phrase. Almost every species has its separate "turn" at the pool and feed-troughs. Perhaps early in the morning the cormorants enjoy the water for a while, then fly to the upper branches to dry themselves. Next the flamingoes may go in, and, after doubling up their thin legs, nothing is visible above the water but their long, snaky necks. After much splashing they go out on the bank to preen themselves, and a medley of little ducks and coots takes possession, shooting and diving through the water in all directions. A serious clash hardly ever occurs between old residents of the cage, and only with recent comers, because the rights of the birds, the established *leges salutis,* are not yet known and recognized.

One example of the good-natured dispositions of the birds is



FLYING CAGE IN AQUATIC BIRDS' HOUSE.

Photographed before trees were introduced.

frequently noticed. A favorite branch overhanging the water is sometimes occupied by six or eight birds of several different species, asleep. Another crowds in next the trunk, and the outermost one is pushed off into the water. Complaining and protesting, he falls, but soon takes revenge by crowding in at the opposite end of the line. Thus, again and again, when one would think a quarrel impending, only good-natured complaints are heard, and these last but a few moments.

Comparison of the inmates of this flying cage with corresponding classes of human beings which they recall, is inevitable. Thus, the snowy egrets are likened to dashing, exquisite courtiers only too ready with rapier beak; the wood ibises suggest the buffoons; the cormorants are like rollicking boys; the pelicans seem like aged men with second-childhood's stage upon them, and the night-herons suggest rheumatic old persons of the most irascible type. And where else, in a smaller cage, could such curious friendships develop? Here, where the glossy ibises and the tree-ducks learn reciprocity, the latter permitting themselves to be pummelled and pushed as the long beak of the ibis searches their feathers for stray lice, or where a baby flamingo and a demoiselle crane become inseparable companions; where the great white pelican in a spirit of play actually tosses up the tiny Java ducks, and catches them in his huge pouch unhurt; where a cormorant rescues an over-greedy duck from an ignominious fall into the shrimp pail; where the coots swim unheeded between the stick-like legs of the flamingoes—here, where these and a hundred other incidents occur daily and hourly, approximately perfect conditions have been achieved for giving the birds what we owe them in taking them from the woods and fields—plenty of room, fresh air, protection from cold and enemies, and an abundance of good food and water. The crowds that frequently are banked three deep around this cage are the best evidence of the interest it arouses among all classes of visitors.

V. Æsthetic Effect of Diverse Forms and Colors.—The last advantage, which, although of less vital importance in some ways, yet ought not to be ignored, is the pleasure to be derived from the beautiful kaleidoscopic effect of many living, active birds associating together—an animated mosaic of many colors and forms, gracefully mingling and producing a result with which the most beautiful bird could not be compared when confined by itself.

This should not be thought of in connection with artists merely, but as an important adjunct in holding the attention and interest of the majority of the people, and in promoting an intelligent appreciation of the beauties of Nature. If by thus presenting something more than a dry, scientific label in front of a spiritless bird, the higher side of man's nature is touched and aroused, surely an important part of the ultimate purpose of a Zoological Park is accomplished.

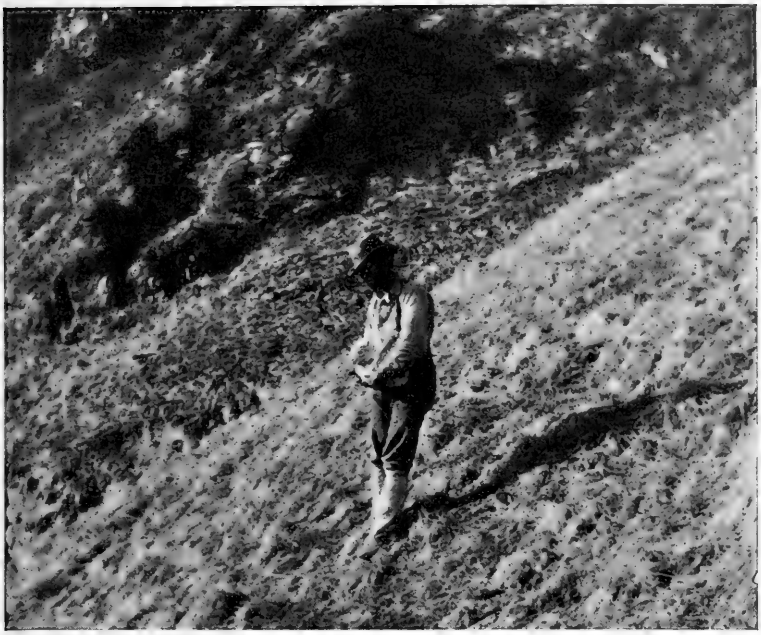


PHOTO BY J. A LORING.

CARRYING A CAPTURED LAMB.

THE SOCIETY'S EXPEDITION TO ALASKA.

IN the spring of 1901 the New York Zoological Society decided to send an expedition to Alaska for the twofold purpose of establishing connections at all the principal points along the Alaskan coast, and to secure such living animals as had been captured during the winter and held for sale. Mr. J. Alden Loring was selected as the Field Agent of the Society for this purpose. He left for Alaska, from Seattle, on March 26, 1901, and returned from this expedition on September 15th. Besides bringing with him several bears, he established a number of lines of communication with residents of the principal points along the Alaskan coast, which it is hoped will furnish a continuous supply of living animals in the future.

During recent years Alaska has proven a rich field for scientific research, and has produced some startling forms of large

animals which were new to science. Chief among these is the great Kadiak bear *(Ursus middendorffi)*, the largest of living carnivores, and rivaling the great cave bear in size. The greatest among all living deer is the giant Alaskan moose *(Alces gigas)*; and next in interest come the various mountain sheep of Alaska. Of especial importance is the white mountain sheep *(Ovis dalli)*, both on account of the beauty of its pelage and the fact that it is widely distributed throughout Alaska. At several points in its distribution it comes near to the coast, and is found at a low altitude. Owing to this fact, the Society hoped to be able to acclimatize on the Atlantic coast specimens of this interesting animal if any could be captured alive. Mr. Loring therefore received instructions to spend a portion of his time in an effort to capture young white sheep. He was successful in this difficult undertaking, and secured three young lambs.

The Society publishes in this Report selections from a large series of pictures obtained by Mr. Loring in Alaska, illustrating the country inhabited by these sheep, the method of their capture, and the living animals themselves. A further series of these pictures and a detailed account of the expedition will be a feature of the next Bulletin of the Society.

It was decided by Mr. Loring, after a consultation with those best posted on the distribution of sheep, to proceed to the Knik Arm of Cook Inlet, on the southern coast of Alaska. He was fortunate in securing the services of H. H. Hicks, a noted guide of that region, as well as three Indians. He established his camp on the Knik River, and spent several weeks watching the mountain-side at the snow-line, for sheep. Quite a number of sheep were seen in this way, and were found to graze during the day on the open strip of grass above timber-line on the mountain-side and below the snow which covered the crags at the top of the range. The sheep retreated to these crags at night, and at the first approach of danger. Bands of sheep, as well as solitary individuals, chiefly rams, were visible along the mountain-side. At last a band of ewes was seen, and finally a newborn lamb was located high up on the mountain. After a hard climb the various members of the party succeeded in surrounding the lamb and its mother, and the former was secured without much struggle on its part to escape. It was carried down the mountain-side slung in an improvised hammock.

PHOTO BY J. A. LORING

MOUNTAINS NEAR KNIK RIVER, ALASKA, WHERE *OVIS DALLI* LAMBS WERE CAPTURED.

The little animal was fed on diluted condensed milk, and was put in a corral made of saplings. It became at once very tame, but insisted upon being close to its captor, and was induced finally to sleep under Mr. Loring's blanket. The lamb was 10½ inches high at the shoulder, weighed eight and a half pounds, and had four front teeth. It lived about three days, and then faded slowly and died, in spite of all efforts to keep it alive.

Meantime a storm had swept over the mountains, and apparently had driven away the small bunches of ewes which the expedition had under observation. A change in the location of the camp was made to a point lower down the river, where sheep had been seen in previous years. The new camp was located so that a wide sweep of mountains could be kept constantly under the observation of field-glasses, which the party took turns in using. Two bunches of ewes, containing five and twelve ewes respectively, were located, and later a single ewe with a lamb was seen. After a very hard climb the ewe and her lamb were surrounded, and the latter captured. This lamb proved to be only a few hours old. During the efforts to capture it another ewe and lamb were located close at hand, and one of the Indians sent after it; he succeeded in capturing it. This second lamb proved to be much stronger than either of the former captures. When taken back to camp the two lambs were perfectly happy together, and bade fair for several days to survive the diet. They were placed in a movable wire cage, and slept at night in the tent with Mr. Loring under his blanket.

After a day or so the smaller lamb began to sicken, and was fed with Nestle's baby-food in place of condensed milk. This seemed to answer the purpose for a while, but both the lambs became worse suddenly, and died on June 6th. It was then so late in the season that further efforts to capture lambs was out of the question, and the party returned to Tyonek, where they found that two young moose had been captured by the Indians, but both died before coming into the possession of Mr. Loring.

This expedition has demonstrated the practicability of capturing young sheep alive, but how they can be fed after capture is another question. This might be solved by taking into camp milch goats or domestic sheep. The extremely tender age at which the wild lambs must be captured is, of course, greatly against their survival, but it is by no means impossible that

specimens of this beautiful sheep may be seen alive on the Atlantic coast in the near future.

The expedition found sheep in small bunches where Professor Dyche had seen them in hundreds a few years ago. They are being rapidly killed off for the sake of their meat, hides, and for the trophies afforded by their horns. The same destruction is being meted out to the other large game animals of Alaska, and the tragedy of the destruction of the American bison is being enacted over again in our Arctic province. It threatens the extermination not of a single species, but of all the different species of mountain sheep, mountain goats, caribou, and moose indiscriminately, as well as of the bear and other carnivores. Laws, if properly enacted, may postpone the day of destruction, but the most effective measure for the preservation of the animal life of Alaska would be the creation of large game reserves in suitable localities, where the killing of any sort of animal is absolutely prohibited, as it is to-day in the Yellowstone Park.

Following this article are the notes by Mr. Loring on the various mammals and birds under observation during the expedition, and some suggestions as to the need of game laws, and the particular points to be covered by the proposed legislation.

MADISON GRANT.

PHOTO BY J. A. LORING. COPYRIGHT, 1902, N. Y. ZOOLOGICAL SOCIETY.

WHITE MOUNTAIN SHEEP LAMBS,
Captured in Alaska for the Zoological Park.

NOTES ON THE DESTRUCTION OF ANIMAL LIFE IN ALASKA.

BY J. ALDEN LORING,

FIELD AGENT, N. Y. ZOOLOGICAL SOCIETY.

I HAVE been asked by many persons in Alaska to attempt to do something to save the large mammals of that territory from the destruction which now threatens them.

At present Alaska has no game-laws, and the time has come when some legislation should be enacted to protect its most valuable animals from total destruction. While many will say that there is yet an abundance of game in that country, we must not wait until wild life has been so diminished that it is necessary to prohibit killing for a period of years in order to preserve the different species. Alaska is a new country, and, like most countries when new, portions of it still contain a great many wild animals. But the same wanton destruction is going on there that always follows civilization.

In the opening up of Alaska, the game is going to play the same part that the buffalo did in civilizing the Western States. The people there realize what the extermination of game means to them. Miners, natives, and prospectors understand that it would cut short their only supply of fresh meat, and most of them would favor the enactment of reasonable game-laws.

It is not the number of animals actually killed for food that decreases the ranks, so much as those wantonly destroyed, or shot for only a portion of their bodies. It is believed by responsible men that five moose are killed for every one that is used.

Already game has diminished to such an extent that it is necessary to prohibit even prospectors and natives from killing it during the breeding season. But this will be no great hardship, for other than a few animals killed by the natives, the amount

shot during the summer is small. Most white men recognize the laws of nature, and will not eat meat killed during the summer. In spring and summer the Indians have an abundance of salmon, and do not need to kill moose and other land animals.

There is a belt along the north and west sides of Cook Inlet wherein game of all kinds has greatly diminished during the past few years. Next to the destruction of moose and caribou, the case of the Sitka deer is probably the most serious of all. These beautiful little creatures are found in vast numbers on the islands and along the coast of southwestern Alaska. Beginning about September 1st, both native and white hunters cruise among the islands in small boats, and either hunt the deer with jack-lights or run them into the water with dogs and shoot them while swimming. The greatest slaughter occurs about Wrangel, where the deer are most abundant. Carcasses often sell for a dollar each, and frequently the bodies of deer are piled up on the wharves like cord-wood. I was told by one person that he has seen the loft of a warehouse hanging so thickly with their bodies that it seemed impossible to crowd in even one more.

It is no uncommon occurrence for sloops manned by small crews to return from a few days' trip with from fifty to seventy-five carcasses. But often only the hind-quarters are taken. From my note-book I copy the following under the name of Harry Pigeon of Wrangel: "I saw a party of five persons return from a week's hunt with one hundred and fifty-two carcasses of deer aboard their sloop."

While the slaughter is not quite so extensive in other localities, it is probably because the deer are not so plentiful. During the summer, when the meat and hides are not good, the number killed is comparatively small. Deer-skins have a commercial value of from ten to twenty cents each, and small as this is, thousands are slaughtered for their hides alone. While at Juneau I saw in the Pacific Coast Company's warehouse ten bundles of deer-hides, each containing about seventy skins, waiting shipment. A few weeks later a second shipment of the kind was made.

With the moose, while the slaughter is not so great, numbers are wantonly killed, as the following instance will show: Two men at Chickaloon Bay, near Turnagain Arm, Cook Inlet,

killed sixteen moose in two days. The first day one shot eight, and the other seven. In order to make an equal showing with his companion, the one who killed only seven took pains to shoot another the next morning. Little if any of the meat was taken.

The Indians take advantage of windy weather for moose-hunting, as it is then an easy matter to approach within gun-shot and kill a great number. They hunt them extensively with dogs also.

The North American Company's agent at Knik placed an order with the Indians for twenty-four head-skins, from heads of bull-moose only. One windy day the total number was secured, and the relator was quite confident that more than were asked for were brought in.

In the summer of 1889 one Indian killed about fifty moose back of Tyonek. Naturally, moose have greatly diminished in that locality. In the winter of 1901 one of my Indians killed five moose back of Knik, and saved the meat of but one. When asked why he did not use them all, he replied that "they were bulls!"

While the reports from Kenai peninsula seem to indicate that moose have not so seriously diminished in that quarter, there is no doubt but that they are killed much faster than they breed, and there is no reason whatever why they should be killed when not urgently needed as food.

Although sheep are still found in fair numbers on the mountain ranges bordering the coast and rivers of Cook Inlet, they are far from being as abundant as eight years ago. In the locality we visited they have diminished to such an extent that the Indians say "they have left the country"; and now they do most of their hunting in other quarters. Where Professor L. L. Dyche saw bands of hundreds in the summer of 1894, we counted only sixty-four animals in all.

Probably the demand for heads and skins is doing more toward diminishing the game about Cook Inlet than anything else. Tempted by the prices offered for heads, the Indians and a few whites shoot promiscuously in hope that the animal killed may prove to have extra large antlers or horns. As it is usually impossible to judge the size of a head until its owner lies at one's feet, hundreds of animals are slain without being touched.

Through the irresistible desire of the Indian to kill everything he can, whether useful or not, when he gets into a band of animals he shoots as long as they are in range. Fortunately he is a very poor marksman, or there would not now be much game alive in Alaska.

Naturally the question arises, How are we to stop this wanton destruction of animal life? My own recommendations for game-laws are as follows:

Miners, prospectors, and natives should have the right to kill male animals solely for their own use as food while in camp at all seasons of the year; but against all other persons a closed season should be enforced, except for a limited period in the autumn. During the open season any person should be allowed to kill two animals of each species, but when the animals or parts of animals so killed are shipped or transported, they should be accompanied by the owner. The greatest protection to the game of Alaska, however, would be the prohibition of the sale of meat and hides of all wild Alaskan ungulates. To accomplish this, it should be made a misdemeanor for railroad, steamship, express or freight companies, or private individuals, to receive or ship meat, hides, or horns except upon permit issued by the Secretary of the Interior, or an agent appointed by him.

Alaska is an immense territory, and the question arises how we are going to enforce game-laws?

The revenue cutter service could give great aid, and collectors of ports could be instructed to act upon all violations which come to their notice. Salaried game-wardens, having no private interests whatever in Alaska, should be appointed, and it would be their business to watch and prosecute all violators of the law.

With the native, the Church is stronger than the government. It would seem, therefore, that a very effective way to reach them would be through the priests and missionaries. Representatives could be chosen to visit the missions, and through the priests and missionaries explain to the natives that game-laws have been passed, point out to them their objects and the necessity of abiding by them, and ask their assistance. In this way a great deal of good might be done.

NOTES ON MAMMALS AND BIRDS OBSERVED IN SOUTHERN ALASKA IN 1901.

BY J. ALDEN LORING,

FIELD AGENT, N. Y. ZOOLOGICAL SOCIETY.

In submitting these notes on birds and mammals I wish to say that it should be remembered that the object of the expedition to Alaska was to collect live animals, and the Society's representative had explicit instructions to devote his entire time to that work.

He is aware that these reports are far from complete, but submits them for what they may be worth. They relate chiefly to observations made in and above the head of Cook Inlet and the Knik Arm.

MAMMALS.

Delphinapterus leucas, *(Pall.)*. WHITE WHALE.

"Beluga," as both the whites and natives of this part of Alaska call the white whale, were common at the upper end of Cook Inlet. We did not see any in Knik Arm, but on the way to Tyonek they were noted in abundance after leaving Fire Island. They followed close to shore with the tide, coming to the surface but a second at a time. When shot at they dove, and if seen afterward, were usually a long distance off.

Rangifer stonei, *(Allen)*. STONE'S CARIBOU.

At Tyonek I saw the head of a caribou that had been taken in the mountains in the Shushitna River district. Its antlers answered perfectly the description of this new species. I was of the opinion it was the head of a small Barren Ground caribou until the description of *R. stonei* appeared several months later.

Mr. Hicks informed me they were common in the country some seventy-five miles north of Tyonek. The Indians of the Mata-

nuska River country frequently bring caribou skins to the traders at Knik. Many of these skins are identical in color with that of the animal under consideration, while others were much lighter, and with longer hair. I was given to understand that the dark ones were fall skins, while the light ones were from animals killed after midwinter, which I believe to be true.

Alces gigas, *(Miller).* ALASKAN MOOSE.

They are found at many points along the western shore of Cook Inlet, sometimes within five miles of the beach. On both sides of Knik Arm, and in the valley of Knik River, they are common. We saw four during our stay, but did not hunt moose even once. They inhabit the low, marshy ground, as well as the gently rising, timbered slopes.

The natives take advantage of windy days to hunt them, at which time they can approach them within easy range without being detected. Large numbers of moose are wantonly destroyed by the Indians. Fire Island, at the mouth of Turnagain Arm, is said to be one of their favorite breeding-grounds. The young are born from the middle of May to June 10th, and are said to be quite helpless for several days.

Mr. H. H. Hicks, my assistant, says he has killed several cow moose with " bells."

Oreamnos montanus, *(Ord.).* MOUNTAIN GOAT.

Goats inhabit the country about the glacier at the head of Knik River, some sixty miles from its mouth. On May 21st Mr. Hicks and one of my Indians saw, and were near enough to have shot, a goat feeding near the timber on a mountain slope on the north side of Knik River, thirty miles from its mouth. Four skins and skulls in possession of a trader at Knik were brought from the Matanuska River district, where this goat is a rare inhabitant of the mountains some sixty-five miles northeast of Knik. Three of the specimens mentioned represented adult animals. Their horns had none of the striking characters of *O. kennedyi.*

Ovis dalli, *(Nelson).* DALL'S SHEEP: WHITE SHEEP.

While common, these animals are not nearly so abundant as formerly. Where hundreds roamed eight years previously, we saw but sixty-four. Trails, deeply worn in the moss but overgrown with grass, were found above timber-line.

During the winter, when unable to secure grass at high elevations, they descend to the edge of timber-line, and live on browse from the brush until the snow has blown or melted away. I was told by hunters that during severe storms they take shelter among the rocks, where they often remain for a week or ten days.

When the grass appears in the spring, the rams leave the ewes, and are found singly or in small bunches. They soon become fat and lazy, and, unless disturbed, often remain for days in one locality. We found them feeding on grassy slopes, where they spent the most of the day. Not infrequently we saw them in the edge of the brush, but at night they invariably took to the crags. After tiring of one feeding-ground, they moved to another. They always proceeded with caution, pausing every few hundred feet to survey the country. About every quarter-mile they either stopped to feed, or to lie upon the rocks and sun themselves. They shunned bad places, and, when compelled to cross crevices or jump from high positions, slid carefully over the side, and appeared to lower themselves as far as possible before springing across the space. On striking the opposite incline they always took the utmost advantage of their momentum in going up the next slope. Of course at a distance of a mile or more it was difficult to tell the width of the spaces crossed, but I did not see them make any remarkable leaps. Mr. Hicks told me he once came suddenly upon a large ram which, rather than jump ten feet to a grassy slope, turned and ran toward him, passing very near. I did not observe any sentinels posted to watch for the approach of enemies.

Although eagles capture a few young during lambing season, the worst enemies of the white sheep are white men, Indians, and wolves. As they always watch for danger from below, the most successful method of stalking is for the hunter to make a detour, and approach from above.

When we arrived at the mountains, the rams and ewes had separated. The latter were very alert, and generally were found feeding on grassy slopes close to the crags, among which they took shelter at night or whenever alarmed. A bunch often remained in the same locality for days. Several times while we watched, we saw small herds take fright and bound over the rocks to the high peaks, where they remained for a day or so—mere white specks to the naked eye.

The lambing season is at its height by June 10th. After the lambs have attained sufficient strength to climb and run, their mothers return to the band, and about September the bands of ewes are joined by the rams. The little ones frisk about, and play quite like domestic lambs. The females remain in the high mountain-peaks until the young are strong enough to join the band and run with it.

Mr. Hicks says he knows of three instances of two lambs at a birth, but the usual number is one. Contrary to all reports, we found that for a day after birth the lambs were quite helpless, and made little attempt to escape. The last one captured would have escaped had not the Indian killed its mother and succeeded in cornering it. We judged it was three days old. Two others about the same age succeeded in escaping us. Those captured quickly became attached to us, and when left alone ran back and forth in their inclosure, bleating and trying to escape, but quieted as soon as they had company. Their actions were not unlike those of domestic lambs. Their bleat, also, was identical, and while being fed they braced themselves, dropped on their knees, bunted at the feeding-bottle, and pranced about, whipping their tails from side to side in a most ludicrous manner. They slept either with or very near me. When first captured they were easily awakened, but soon became accustomed to the noises about camp. One thing which leads me to believe the lambs' period of nursing is short, is the suddenness with which their front teeth appeared. In twenty-four hours after capture their teeth were fully developed, and I noticed them several times nibbling at leaves or sticks.

In June 1896, when Mr. Hicks was camped near the head of Matanuska River, a band of about fifteen ewes and lambs approached daily for some time, and watched him from a cliff about three hundred yards distant. At first they were timid, but gaining confidence by immunity from attack they seemed to enjoy watching him work about camp. Once he came from his tent very suddenly, and tied a red handkerchief about his neck. This movement frightened the sheep away, but they returned in a few days. A severe thunderstorm that suddenly arose again sent them to the rocks.

Sciurus hudsonius, *(Erxleb.).* HUDSON BAY RED SQUIRREL.

About Tyonek these little squirrels were common, and a few

were seen in the timber along Knik River, but they were not so abundant as at the former place.

Sciuropterus. FLYING SQUIRREL.

Mr. Hicks and the Indians said they had seen a few about Knik.

Spermophilus empetra *sub. sp.?*

We saw them on the grassy slopes and at the edge of the rocks at timber-line, both north and south of Knik River. The Indians use large numbers of skins in trimming moccasins, and I have seen robes composed entirely of them.

Arctomys pruinosus, *(Gmel.).* HOARY MARMOT.

While we saw their skins about the natives' camps, and were told that these animals were common, we saw none. Twice I thought I heard their notes in the mountains along Knik River.

Castor canadensis, *(Kuhl.).* AMERICAN BEAVER.

Several were captured in June, some eight miles south of Tyonek. Old cuttings were noted along Knik River, and on Admiralty Island, near Juneau, I saw fresh beaver work. Fishermen reported capturing one in a seine set in salt water near Tyonek, but their identification of the animal is open to doubt.

Fiber spatulus, *(Osgood).* NORTHWESTERN MUSKRAT.

Common in the lakes, fresh-water ponds, and streams about Knik River.

Erethizon epixanthus myops, *(Merriam).* ALASKAN PORCUPINE.

Said to be common about Hope and Sunrise City. We saw one on May 25th in the mountains, about thirty-five miles from the mouth of Knik River.

Ochotona collaris, *(Nelson).* ALASKAN PIKA.

Said to occur sparingly among the rocks above timber-line. I heard one on May 15th in the mountains near the mouth of Knik River. The Indians have a superstition that if any are killed it will rain for ten days, and so strong is their aversion to the molestation of these animals that parents have been seen to chastise their children for daring to imitate their notes.

Lepus americanus dalli? *(Merriam).* DALL'S VARYING HARE?

While on snowshoe trips into the heavy timber north of Tyonek, during the latter part of April and first days of May, I found varying hares fairly abundant in certain localities. Although there was four feet of snow on the ground, they were changing their color, and many were very dark. In the timber and on the brushy flats bordering the Knik River we found them abundant. Neither the Indians nor my assistant had ever seen hares so abundant elsewhere.

Lynx canadensis mollipilosus, *(Stone).* NORTHWESTERN LYNX.

Tracks were seen in the snow back of Tyonek, but I was told there were few near the beach. We saw where they had been hunting rabbits in the brush on the flats of the Knik River.

Canis occidentalis, *(Rich.).* GRAY WOLF.

None were seen, but their tracks were noted on the flats in the river-bottom, where they had hunted rabbits, and on the snow above timber-line, where no doubt they were in quest of sheep. A large track that was favorably situated measured 5¼ x 3¾ inches.

Vulpes kenaiensis, *(Merriam).* KENAI FOX.

Two foxes—one red, the other silver gray—were held captives by the trader at Knik. They had been captured in the Shushitna River country.

Ursus americanus, *(Pallas).* BLACK BEAR.

Black Bears are abundant in the mountainous region bordering Knik River. Although we did not attempt to hunt bears, we saw fifteen during our stay. They fed above timber-line mostly, although a few tracks were seen in the valley. At Ketchakan I saw two cubs that had been captured in their den about March 15th. They weighed about eight pounds, claws light bone color, and fur woolly.

While it is rare for a bear to come into camp, there are records of their occasionally having done so. It is said that near Hope a miner once watched one rip his tent to pieces and destroy his stores.

We saw furrows in the snow where cubs had slid down-hill, whether intentionally or not there was no means to determine.

Ursus middendorffi, *(Merriam).* KADIAK BEAR or BROWN BEAR, and

Ursus horribilis, *(Ord.).* SILVER-TIP GRIZZLY.

Owing to the great uncertainty regarding the geographic limits of these bears in southern Alaska, I will not add to the confusion already existing by attempting to differentiate them. The persistence with which these two species intermix is almost hopelessly confusing.

The natives state positively that a grizzly bear exists in the mountains north of Tyonek. Both brown bear and skins resembling grizzly bear were seen which came from the Shushitna River district. One is not able to tell, from the names given by the white men, what species they refer to, as they frequently use the term "grizzly" for all bears except the black bear. The young of the brown bear strongly resemble the cubs of the grizzly. One purchased at Porcupine City was called a grizzly, and looked like one, but the skin of its mother was that of a brown bear!

At Kadiak I saw about a hundred bear-skins, and a more varied collection of colors could not be found in any other group of mammals. Bears are abundant about Iliamna and Chitina Bays, but have diminished greatly in other parts of Cook Inlet.

I am indebted to my assistant, Mr. H. H. Hicks, for the following facts relating to the habits of the so-called "brown bear":

"When I have found brown bears in dens with cubs, they always had bedding of leaves and grass. They den up about September 25th and remain until April 1st. At first they do not travel far from their dens, and often return to them at night. Should water run into their dens during winter, they seek other quarters. The usual number of cubs at a birth is one. In the early part of spring their principal food consists of grass and roots."

Brown bears are abundant on Admiralty Island, a short distance west of Juneau. I found the grass about the mouths of salmon streams beaten down as though frequented by cattle. Trails in the moss, a foot in depth, led out of the timber in all directions, and on the banks of the streams were large numbers of salmon with only their bellies eaten.

One rainy afternoon I took a watch on one of these creeks. The salmon were fighting their way up the shallow stream in countless hundreds. Soon I was rewarded by seeing two bears rise from the grass some two hundred yards below. Although I was careful to secrete myself in a favorable locality, they must have scented danger, for they returned to the timber. Soon they appeared again, and, after surveying the flat thoroughly, walked up the edge of the forest toward me. When opposite, and about fifty yards distant, they halted, and rising on their hind legs, looked about. The one in advance was particularly cautious, but the other seemed satisfied that his companion would scent danger if any existed. They were not satisfied, however, and again returned to shelter.

Once more I saw them standing side by side at the edge of the timber, their front feet on a log. At last they ventured out into the tall grass, and each took a dead fish and returned to the timber to eat it. Fifteen minutes later they reappeared, and came to the edge of the stream, not more than a hundred feet from me. I was anxious to see one of them catch a salmon, but it was done so quickly that I can scarcely describe the act. The leading bear came to the edge, and had scarcely stopped when, with a quick sweep of his paw, he threw a salmon upon the bank and seized it in his mouth. On seeing this, his companion ran up and took it away from him. He was probably the master, as he met with little resistance.

I did not intend killing the bears, but the longer I watched, the better seemed their condition, although it was late in the season for prime skins. At last, hoping that their skins and skulls would throw some light upon the much-puzzling question of Alaskan bears, I opened fire with my "Savage." They were not more than twenty-five feet from cover, and I had to work very quickly to stop them before they could reach shelter. At the sound of the first shot the bear not wounded rose upon his hind feet, the fish still in his mouth. My second bullet struck him in the shoulder. Both animals, although mortally wounded, broke for the timber. It was scarcely necessary to shoot them a second time, but I did so in order to end their troubles as quickly as possible.

I remained longer, in the hope of being treated to another fishing exhibition. About five o'clock a third bear came in view

directly opposite my position, and walked out of the timber as though accustomed to the locality. As the grass was three feet high, he could not see the bodies of his dead companions, and approached within five feet before he noticed them. On catching sight of the dead bears he wheeled, reached the timber in about two jumps, and was not seen afterward.

Of the two specimens thus collected, one at least appears to be a typical brown bear, although the natives insisted on calling them both grizzlies. Although in poor pelage, the two bears killed were in much better condition than several skins I saw from bears killed near Kadiak Island fully a month before.

The Indians hold the brown bear in great terror, and will not attack one except under the most favorable circumstances. I learned of several persons who were killed by bears, but in almost every case wherein a person had been attacked, the bear was suddenly surprised at close quarters. Under most circumstances bears are difficult to approach. Their eyesight is poor, but their scent and hearing are both remarkably good.

While the inhabitants of Kadiak Island maintain that bears are still plentiful, different zoological gardens have offered two hundred and fifty dollars each for cubs, and have not yet received one from that island. Four eastern sportsmen who spent the greater part of last summer (1901) in hunting Kadiak bears saw only ten bears during their trip, and they had with them natives who were noted as expert hunters, and familiar with the haunts and habits of the animals. Old residents say that in former years it was not unusual to see several bears at a time. Mr. Thomas W. Hanmore said he had frequently seen such sights. As an old Indian expressed it, Kadiak Bears once were "all the same cattle."

For the past three years the average number of bear-skins received at various points on Kadiak Island by the agents of the Alaska Commercial Company has been about twenty. This figure probably represents two-thirds of the total number killed annually. I was told by Mr. J. L. Davis that the natives about Cape Douglas often killed bears for their intestines, from which they make waterproof garments.

Gulo luscus, (*Linn.*). WOLVERINE.

Mr. Hicks saw the tracks of two at our upper camp, thirty-five miles from the mouth of Knik River.

Mustela atratata actuosa? *(Osgood).* ALASKAN MARTEN.

While none were seen, they are captured along Knik River. I saw skins that were brought from the Matanuska River country, all of which were very pale.

Lutreola vison energumenus, (*Bangs*). PACIFIC MINK.

One was seen while we were on the way to our base camp, some twenty miles from the mouth of the Knik River. It was at the mouth of a muskrat's hole in a bank.

Lutra canadensis pacifica, (*Rhoads*). NORTHERN LAND OTTER.

Two were observed in a small stream about twenty miles from the mouth of Knik River, and their slides were frequently seen. One of my Indians said otter often kill muskrats, and eat them.

Phoca fasciata, (*Zimm.*). RIBBON SEAL.

While none were seen by me, the following entry from my journal is of interest: "Mr. J. B. Carold, of Juneau, says he was told by a reliable hunter that a spotted seal inhabited Iliamna Lake, a large fresh-water lake on the western side of the Alaskan Peninsula." Since this note was made, Mr. J. H. Kidder, of Boston, who spent the summer in Alaska, secured a skin of one of these seals, which proved to be of the species named above. Evidently the seals had traveled up the outlet of the lake, and, finding an abundance of fish, remained there.

Phoca vitulina, (*Linn.*). HARBOR SEAL.

Quite common about Tyonek, where several were seen. The natives frequently shoot them. On May 6th we saw one near the head of Knik Arm.

BIRDS.

Colymbus holbœllii, *(Reinh.).* HOLBŒLL'S GREBE.

A pair of these grebes were seen, May 11th, in a lake back of our camp, some twenty miles from the mouth of Knik River.

Colymbus auritus, (*Linn.*). HORNED GREBE.

Three seen, May 3d, at the mouth of Knik River.

Gavia lumme, *(Gunn.)*. LOON.

Several seen along the river and in the many lakes bordering the foothills.

Stercorarius parasiticus, *(Linn.)*. PARASITIC JAEGER.

Three seen at our base camp twenty miles up Knik River. They were noisy and much disturbed at our presence, flying about our heads uttering loud notes of alarm, and lighting on tops of tall trees.

Larus philadelphia, *(Ord.)*. BONAPARTE'S GULL.

Several seen.

Phalacrocorax pelagicus robustus, *(Ridgw.)*. VIOLET-GREEN CORMORANT.

Numerous flocks of cormorants were seen at many places in the inlet.

Merganser serrator, *(Linn.)*. RED-BREASTED MERGANSER.

Several pairs seen at the mouth of Knik River.

Anas boschas, *(Linn.)*. MALLARD.

Common in the fresh-water lakes and sloughs along the inlet and river. Although a few small flocks were seen, the majority had paired.

Mareca americana, *(Gmel.)*. BALDPATE.

Common along the stream where we were camped, about twenty miles from the mouth of Knik River. They were found in pairs. A female killed, May 10th, contained ovaries the size of a marble.

Nettion carolinensis, *(Gmel.)*. GREEN-WINGED TEAL.

One of the Indians killed a pair at our first camp, twenty miles from the mouth of the river.

Dafila acuta, *(Linn.)*. PINTAIL.

Quite common in the fresh-water lakes and sloughs along the Arm and river.

Clangula clangula americana, *(Bonap.).* AMERICAN GOLDEN-EYE.

This species was the most common of all ducks seen. When we first reached the mountains the ice was not all out of the ponds and small streams, and there was scarcely an air-hole that did not contain a pair of them. They had evidently begun nesting, as large ovaries were found in several killed.

Charitonetta albeola, *(Linn.).* BUFFLE-HEAD.

A common little duck found in the air-holes along frozen streams and lakes.

Histrionicus histrionicus, *(Linn.).* HARLEQUIN DUCK.

My Indians drew my attention to a pair of these ducks at the mouth of the river as we were returning to Knik, June 6th.

Oidemia perspicillata? SURF SCOTER.

Large numbers of Scoters were seen all over the inlet.

Branta canadensis, *(Linn.).* CANADA GOOSE.

Common. When I first arrived at Tyonek, April 24th, they were present in large flocks, and remained so up to the time I left, May 2d. We saw numbers all along the route to our first camp, twenty miles up Knik River. A few pairs were nesting about the lakes at the base of the mountains.

Olor columbianus, *(Ord.).* WHISTLING SWAN.

Never before in the history of the oldest inhabitants of Cook Inlet was there such a flight of swans as this year. We saw flocks of about fifty each, and it was not uncommon for several flocks of from six to ten to pass in a day. A pair nested in a lake a short distance from our camp.

Grus canadensis. *(Linn.).* LITTLE BROWN CRANE.

Several seen at the mouth of Knik River, May 7th.

Gallinago delicata, *(Ord.).* WILSON'S SNIPE.

Very common in the marshes about our camp, twenty miles from the mouth of the river, where they were nesting. For hours at a time they flew about a certain spot, seemingly to exercise their wings. At short intervals they darted toward the earth, making a loud whizzing sound as they descended.

Helodromas solitarius cinnamomeus, *(Brewster).* WESTERN SOLITARY SANDPIPER.

At our base camp several pairs were seen; they were nesting.

Actitis macularia, *(Linn.).* SPOTTED SANDPIPER.

One seen at our base camp. I whistled to it, and it lighted on the gunwale of the boat.

Ægialitis *sp.?* PLOVER.

On a flat in the river-bottom, about thirty-five miles from its mouth, we saw a pair of plovers about the size of Killdeer. They were stouter, and had a black band across their breasts.

Canachites canadensis osgoodi, *(Bishop).* ALASKA SPRUCE GROUSE.

During the latter part of April and May 1st I found these grouse not uncommon in the timber back of Tyonek. They were not as tame as a person would expect; in fact, I found it rather difficult to approach them before they took wing. No flocks were seen, they evidently having mated. At our base camp we saw several. One which an Indian killed, May 10th, contained large ovaries.

Lagopus leucurus, *(Swains & Rich.).* NORTHERN WHITE-TAILED PTARMIGAN.

In the high mountains at our upper camp, about thirty-five miles from the mouth of the river, White-tailed Ptarmigan were common. They were found in pairs, and were very tame. I approached to within six feet of one and photographed it.

Circus hudsonius, *(Linn.).* MARSH HAWK.

Several were seen about Tyonek and the lowlands along Knik River. One was noted May 1st.

Accipiter velox, *(Wils.).* SHARP-SHINNED HAWK.

Several were seen in the river-bottom.

Haliæetus leucocephalus alascanus, *(Town.).* ALASKA BALD EAGLE.

Several seen at Tyonek and on the Knik River, where a pair was nesting but a short distance from one of our camps.

Pandion haliaëtus carolinensis, *(Gmel.).* AMERICAN OSPREY.

A single specimen seen flying down Knik River, June 5th. It was near the mouth of the stream, and my Indians first drew my attention to it. Neither they nor Mr. Hicks had seen the species before, so I think it must be uncommon in the country.

Bubo virginianus saturatus, *(Ridgw.).* DUSKY HORNED OWL.

Two seen and several heard.

Ceryle alcyon, *(Linn.).* BELTED KINGFISHER.

Not uncommon; several were seen at our base camp.

Colaptes auratus, *(Linn.).* FLICKER.

Several were seen in the timbered bottoms along the river.

Otocoris alpestris leucolæma, *(Coues).* PALLID HORNED LARK.

A few seen in the river-bottom, but most common above timber-line.

Pica pica hudsonica, *(Sab.).* AMERICAN MAGPIE.

Several noted near our base camp, and while above timber near the mouth of Knik, June 3d, we saw a pair at the head of the valley. There was a nest in the edge of the timber that had the appearance of being used the year before.

Perisoreus canadensis fumifrons, *(Ridgw.).* ALASKAN JAY.

Several were seen about Tyoonok and at our base camp. A family of young able to take care of themselves were noted, May 22d.

Corvus corax principalis, *(Ridgw.).* NORTHERN RAVEN.

About half a dozen were seen flying about the rocks at the base of the mountains near one of our camps.

Pinicola enuclator, *sub. sp.?* PINE GROSBEAK.

A small flock were seen feeding one morning in front of our base camp.

Spinus pinus, *(Wils.)*. PINE SISKIN.

Very common.

Zonotrichia coronata, *(Pall.)*. GOLDEN-CROWNED SPARROW.

Common in the river-bottoms. In full song May 15th.

Junco *sp.?* JUNCO.

Juncos were common, but what species I cannot tell.

Melospiza melodia kenaiensis, *(Ridgw.)*. KENAI SONG SPARROW.

Several were heard in the river-bottom.

Tachycineta bicolor, *(Viell.)*. TREE SWALLOW.

I noticed several flocks of these birds flying about a sparingly timbered flat about thirty miles up Knik River.

Clivicola riparia, *(Linn.)*. BANK SWALLOW.

Several were seen at the mouth of Knik River.

Anthus pensilvanicus, *(Lath.)*. AMERICAN PIPIT.

Pipits were common on the mountains at and above timber-line.

Parus atricapillus septentrionalis, *(Harris)*. LONG-TAILED CHICKADEE.

Common at Tyonek, Knik, and the region visited on Knik River.

Hylocichla *sp.* THRUSH.

Thrushes were common, and during the long summer nights could be heard at all hours.

Merula migratoria, *(Linn.)*. AMERICAN ROBIN.

Robins were frequently seen in the poplar groves about Knik, and the river bottoms. The first one noted was seen May 4th.

CHARTER

OF THE

New York Zoological Society.

CHAPTER 435.

AN ACT to incorporate the New York Zoological Society and to provide for the establishment of a zoological garden in the city of New York. As amended by Chapter 146 of the Laws of 1902.

Accepted by the city. Became a law April 26, 1895, with the approval of the Governor. Passed, three-fifths being present.

The People of the State of New York, represented in Senate and Assembly, do enact as follows:

SECTION 1. Charles A. Dana, Oswald Ottendorfer, Andrew H. Green, William H. Webb, Henry H. Cook, Samuel D. Babcock, Charles R. Miller, George G. Haven, J. Hampden Robb, Frederic W. De Voe, J. Seaver Page, Rush C. Hawkins, David James King, Wager Swayne, Charles A. Peabody, Jr., Charles E. Whitehead, Charles R. Flint, Samuel Parsons, Jr., Mornay Williams, Henry E. Gregory, Isaac W. Maclay, Isaac Rosenwald, Hugh N. Camp, Andrew D. Parker, Cornelius Van Cott, William F. Havemeyer, Frederick Shonnard, William W. Thompson, Alexander Hadden, Edward L. Owen, John H. Starin, Rush S. Huidekoper, William W. Goodrich, Albert H. Gallatin, Frederick S. Church, Edward C. Spitzka, Robert L. Niles, Madison Grant, C. Grant La Farge, William Van Valkenburg, and such other persons as may, under the provisions of its by-laws, become members of the corporation hereby created, are hereby created a body corporate and politic, by and under the name of the New York Zoological Society.

SEC. 2. Said corporation shall have power to establish, maintain, and control zoological parks, gardens, or other collections for the promotion of zoology and kindred subjects, and for the instruction and recreation of the people. Said corporation may collect, hold, and expend funds for zoological research and publication, for the protection of wild animal life, and for kindred purposes, and may promote, form, and co-operate with other associations with similar purposes, and may purchase, sell, or exchange animals, plants, and specimens appropriate to the objects for which it was created.

SEC. 3. The managers of said corporation shall have power to make and adopt by-laws for the management and government of its affairs and business, for the admission, suspension, and expulsion of its members, and for the terms and conditions of membership; to prescribe the number and mode of election of its officers; to define their duties; to provide for the safe-keeping of its property, and from time to time to alter and modify its by-laws.

SEC. 4. The affairs and business of said corporation shall be managed and controlled by a board of managers, the number of whom shall be prescribed by the by-laws. The first board of managers shall be divided by lot into three classes, equal in number, one of which classes shall hold office for one year, another for two years, and the other for three years; and all persons elected to be managers at any subsequent election shall hold office for three years, and until others are elected in their stead. There shall be a president, two vice-presidents, treasurer and secretary, to be elected by the board of managers annually, who shall hold office until others are elected in their stead. The first meeting under this act may be held at any time upon a notice of five days, signed by any five of the incorporators named in the first section of this act, fixing a time and place for such meeting, a copy whereof shall be mailed to each of said incorporators at his usual post-office address, and twelve of such incorporators shall be a quorum for the purpose of organization, adoption of by-laws, and election of officers. No manager of said corporation shall be interested, directly or indirectly, in any contract concerning its property or affairs.

SEC. 5. Said corporation may raise money by the issue of its bonds, secured by a mortgage on any or all of its property not acquired from said city or state.

SEC. 6. Said corporation may take, purchase, and hold real and personal estate necessary for the purpose of its incorporation, the net annual income of which shall not exceed fifty thousand dollars, and shall possess the general powers and be subject to the restrictions and liabilities prescribed in the third title of the eighteenth chapter of the first part of the revised statutes.

SEC. 7. The commissioners of the sinking fund of the said city are authorized in their discretion to allot, set apart, and appropriate for the use of said corporation, any of the lands belonging to said city north of One Hundred and Fifty-fifth street, but not in the Central Park, and such appropriation may be revoked if, after the expiration of five years from the passage of the act, a zoological garden is not established thereon; said grounds thus set apart and appropriated shall be used for no purpose whatsoever except those aforesaid. As soon as any lands are set apart the Mayor of the said city of New York, and the President of the Department of Parks of said city, shall become and be ex-officio members of the board of managers of said corporation. If at any time the animals now composing

the menagerie at Central Park shall be removed therefrom by the authorities having charge thereof, said authorities may make an arrangement with the incorporators named in this act or the corporation formed by them for leasing or sale of such animals to such incorporators or corporation, and said incorporators or corporation shall have a preference over any other person or corporation in respect thereto upon the same terms which said authorities could make with any such other person or corporation, or upon such other terms as to such authorities may seem proper, but nothing herein provided shall be construed as giving the commissioners of the Department of Public Parks authority to sell, lease, transfer, or in any other wise dispose of said animals or other property connected with or belonging to said menagerie.

SEC. 8. Admission to the said gardens shall be free to the public for at least four days, one of which shall be Sunday, in each week, subject to such rules and regulations as shall be prescribed by said corporation.

SEC. 9. This act shall take effect immediately.

STATE OF NEW YORK,
OFFICE OF THE SECRETARY OF STATE, } *ss.:*

I have compared the preceding with the original law on file in this office, and do hereby certify that the same is a correct transcript therefrom, and of the whole of said original law.

L. S.

Given under my hand and the seal of office of the Secretary of State, at the city of Albany, this third day of May, in the year one thousand eight hundred and ninety-five.

ANDREW DAVIDSON,

Deputy Secretary of State.

BY-LAWS

OF THE

New York Zoological Society.

ARTICLE I.

MEETINGS OF THE SOCIETY.

SECTION 1. The office and place of business of the New York Zoological Society shall be in the City of New York, unless otherwise ordered.

SEC. 2. The Society shall hold its annual meeting for the election of Managers, and other business, on the second Tuesday of January, or such day thereafter during the month of January to which said annual meeting shall adjourn.

SEC. 3. Special meetings of the Society shall be called by the Secretary, upon the request of the President or the Chairman of the Executive Committee, or at the written request of ten members.

SEC. 4. Notices of all meetings shall be mailed to each member of the Society at least three days before such meeting.

SEC. 5. At meetings of the Society twenty members shall constitute a quorum.

SEC. 6. The order of business shall be as follows:

1. Roll call.
2. Reading of minutes not previously read.
3. Report of Executive Committee.
4. Report of Secretary.
5. Report of Treasurer.
6. Report of Director.
7. Election of Managers.
8. Communications.
9. Miscellaneous business.
10. Reports and resolutions.

ARTICLE II.

BOARD OF MANAGERS.

SEC. 1. The Board of Managers shall consist of thirty-six members, together with the Mayor of New York and President of the Park Board, or Commissioner for the Bronx, who shall be members *ex-officio* of the board.

SEC. 2. Nineteen managers shall constitute a quorum, but ten managers may transact current business, and adjourn, subject to the subsequent approval of a meeting at which a quorum shall be present.

SEC. 3. The Board of Managers shall hold an annual meeting on the third Tuesday of January, or on such day thereafter to which said annual meeting shall adjourn. Regular meetings of the Board may also be called by the Secretary on the third Tuesdays of October and April, upon the request of the President or Chairman of the Executive Committee. Special meetings of the Board shall be called at any time by the Secretary, upon the request of the President or the Chairman of the Executive Committee, or at the written request of five Managers.

SEC. 4. Notices of meetings of the Board shall be mailed to each Manager at least three days before such meetings.

SEC. 5. The successors to the outgoing class of Managers shall be elected by the Society at its annual meeting, but vacancies in the Board may be filled for the unexpired term by the Board of Managers, or by the Executive Committee.

SEC. 6. A Nominating Committee shall be annually appointed by the Executive Committee, and shall consist of three members of the Society at large, who shall nominate and post ten days before the annual election the names of twelve persons to succeed the outgoing class of Managers in a conspicuous place in the office of the Society.

SEC. 7. No person shall be eligible for election to the Board of Managers, except to fill vacancies, unless his name shall have been posted as a candidate by such Committee, or by not less than ten members, in writing, in a conspicuous place in the office of the Society ten days before the annual election.

SEC. 8. Any Manager who shall fail to attend three consecutive meetings of the Board, unless excused by vote of the Board, shall cease to be a Manager.

SEC. 9. The Board of Managers shall at its annual meeting elect a President, two Vice-Presidents, a Secretary and a Treasurer, who shall hold office for one year, or until their successors are elected. The President, Vice-Presidents and Treasurer shall be members of the Board.

SEC. 10. The Director of the Zoological Park, and all other persons employed by the Society, shall be appointed by the Board or by the Executive Committee, and shall hold office during the pleasure of the Board.

SEC. 11. The Board shall, at its annual meeting, elect an Executive Committee and Auditing Committee, which shall hold office for one year, or until their successors are elected. The Board of Managers and the Executive Committee shall also have authority to appoint such other Committees or Officers as they may at any time deem desirable, and to delegate to them such powers as may be necessary.

SEC. 12. The order of business of the meetings of the Board shall be as follows :

1. Roll call.
2. Reading of minutes not previously read.
3. Report of Executive Committee.
4. Report of Secretary.
5. Report of Treasurer.

6. Report of Auditing Committee.
7. Report of Director.
8. Election of Officers.
9. Election of Committees.
10. Election of new members.
11. Communications.
12. Miscellaneous business.

SEC. 13. All reports and resolutions shall be in writing, and the ayes and nays may be called on any resolution at the request of one Manager.

SEC. 14. Whenever the funds of the Society shall permit, the Board of Managers or the Executive Committee may award medals or other prizes for meritorious work connected with the objects of the Society.

ARTICLE III.

OFFICERS.

SEC. 1. The officers of the Society shall consist of a President, two Vice-Presidents, a Treasurer, a Secretary and a Director of the Zoological Park. These officers, with the exception of the Director, shall be elected at the annual meeting of the Board of Managers, but any vacancy may be filled for an unexpired term by the Board of Managers, or by the Executive Committee, until the next annual election.

SEC. 2. The President shall preside at all meetings of the Board and of the Society, and shall be *ex-officio* a member of the Executive and Auditing Committees.

SEC. 3. The Vice-Presidents shall, in the absence of the President, perform his duties and possess his powers, acting in the order of their election.

SEC. 4. The Treasurer shall receive, collect and hold, subject to the order of the Board of Managers, or the Executive Committee, all dues, subscriptions, fees and securities. He shall pay all bills as ordered by the Board of Managers or the Executive Committee, and shall report to the Society at its annual meeting, and to the Board of Managers at all regular meetings and to the Executive Committee at each meeting. He shall keep all moneys and securities in some bank or trust company to be approved by the Board of Managers or Executive Committee. The books of the Society shall at all times be open to the inspection of the Managers.

SEC. 5. The Secretary shall be a salaried officer of the Society. He shall be present, unless otherwise relieved by the Board or Executive Committee, at all meetings of the Society, of the Board and of the Standing Committees. He shall keep a careful record of all proceedings, shall have the custody of the seal, archives and books, other than books of account, and shall conduct the correspondence of the Society. He shall issue all notices and tickets and shall perform such other duties as the Board may direct. He shall be a member *ex-officio* of the Executive and Auditing Committees and of the Scientific Council.

SEC. 6. The Director of the Zoological Park shall be elected annually by the Executive Committee at a salary to be determined by said Commit-

tee, and paid monthly from funds of the Society.* He shall be the responsible administrative officer of the Park, and shall recommend to the Executive Committee candidates for the various positions in the Park. He shall also perform all such other duties in connection with the business, scientific and literary administration of the Society as may be assigned to him by the Executive Committee.

ARTICLE IV.

COMMITTEES.

SEC. 1. There shall be two standing committees, the Executive Committee and the Auditing Committee, which shall hold office for one year or until their successors are elected.

SEC. 2. The Executive Committee shall consist of seven Managers, together with the President and Secretary of the Society *ex-officio*. Four members shall constitute a quorum, and all meetings shall be called by the Chairman. The Executive Committee shall fill all vacancies in its own number and shall have the full powers of the Board of Managers, except so far as such delegation of power may be contrary to law.

SEC. 3. The Executive Committee shall have the control and regulation of the collections, library and all other property of the Society, and shall have power to purchase, sell and exchange specimens and books, to employ and control all officials and employees of the Society and Park, and generally to carry out in detail the directions of the Board of Managers and the terms of any contract between the City, or Park Board, and the Society.

SEC. 4. All the rules and regulations for the examination of applicants for the various positions in the Park shall be made or approved by the Executive Commttiee.

SEC. 5. The Executive Committee may regulate the auditing and payment for all current accounts.

SEC. 6. The Executive Committee shall annually appoint a Nominating Committee, whose duties and powers are set forth in Sections 6 and 7, Article II. of these By-Laws.

SEC. 7. It shall also appoint a Scientific Council whose powers and duties are set forth in Section 2 of Article V. of the By-Laws.

SEC. 8. The Committee shall make a written report at each regular meeting of the Board of Managers.

SEC. 9. The Auditing Committee shall consist of three regular members of the Society, in addition to the President and Secretary, members *ex-officio*, and vacancies shall be filled by the Executive Committee. It shall be the duty of the Auditing Committee to audit, annually, the accounts of the Treasurer and of the Director, and any other accounts of the Society, and shall report to the Board of Managers at its annual meeting.

*Until such time as he enters fully upon his public administrative duties.

ARTICLE V.

SCIENTIFIC COUNCIL.

SEC. 1. The Executive Committee shall annually appoint a Scientific Council of not more than ten members, and shall fill all vacancies. Members of the Council shall hold office until their successors are appointed.

SEC. 2. The duties of the Council shall be to act as an advisory board in all matters pertaining to the scientific administration of the Society, and especially as to the scientific features of the Park, the promotion of zoology by publications and otherwise, and the preservation of the native fauna of America.

SEC. 3. Four members, including the Chairman, shall constitute a quorum. The Chairman shall be elected annually by the Council. The Secretary of the Society shall be a member and Secretary *ex-officio* of the Council.

ARTICLE VI.

MEMBERS.

SEC. 1. The present members and such others as shall become associated with them, under the conditions prescribed by the By-Laws, shall be members of this Society as long as they shall comply with the By-Laws.

SEC. 2. Members failing to comply with these By-Laws, or for other good and sufficient cause, may be expelled from the Society by the Executive committee.

SEC. 3. Candidates for membership shall be proposed and seconded by members of the Society. The name, occupation and place of residence of every member so proposed shall be submitted for election to the Board of Managers or the Executive Committee, and such person, when elected, shall become a member upon payment of the annual dues, or of the fees as prescribed below.

SEC. 4. The annual dues shall be ten dollars, payable in advance, on the first day of May of each year, but the Executive Committee may remit the dues for the current year in the case of members elected between January 1st and May 1st of each year. The classes of membership shall be as follows:

SEC. 5. The payment of $200 at one time shall constitute any member a Life Member.

SEC. 6. The payment of $1,000 at one time, or in the case of a Life Member, of $800, shall constitute any member a Patron.

SEC. 7. The payment of $2,500 at one time, or in the case of a Patron of $1,500, or of a Life Member of $2,300, shall constitute any member an Associate Founder.

SEC. 8. Any member who shall donate to the Society $5,000, or property of equal value, or any Associate Founder who shall donate $2,500, or any Patron who shall donate $4,000, may be elected by the Board of Managers or Executive Committee a Founder.

SEC. 9. Any member who shall donate to the Society $25,000, or any Founder who shall donate $20,000, may be elected by the Board of Managers or Executive Committee a Benefactor.

SEC. 10. Persons who have rendered marked service in the science of zoology or natural history may be elected Honorary Members, but not more than three such Honorary Members shall be elected in any one calendar year.

SEC. 11. Residents who have rendered scientific services to the Society, or marked services in zoology or natural history, may be elected as Permanent Fellows.

SEC. 12. Non-residents who communicate valuable information to the Society, or who have rendered marked service in the science of zoology or natural history may be elected Corresponding Members.

SEC. 13. Benefactors, Founders, Associate Founders, Patrons, Life Members, Honorary Members, Permanent Fellows and Corresponding Members shall be exempt from annual dues.

ARTICLE VII.

PRIVILEGES OF MEMBERS.

SEC. 1. A member's ticket admits the member and his immediate family to the Park on reserve days, and to all lectures and special exhibitions, and may be used by the member's immediate family, and shall be good for the current year.

SEC. 2. Admission tickets, each admitting two persons on reserve days, are issued to members for distribution, and are good for the current year.

SEC. 3. Each member of the Society is entitled annually to a member's ticket and to ten admission tickets.

SEC. 4. Each member shall also receive one copy of the catalogue or handbook, the report and official publications of the Society, and shall have all the privileges of the Library and Members' Building.

SEC. 5. No member shall be entitled to the privileges enumerated in this Article unless his annual dues shall have been paid.

SEC. 6. The Life Members shall have all the privileges of Members and ten additional admission tickets.

SEC. 7. Benefactors, Founders, Associate Founders and Patrons shall have all the privileges of Life Members, and shall in addition receive copies of all scientific works published by the Society.

SEC. 8. Any member who shall fail to pay his annual dues within three months after the same shall have become due, and after notice of thirty days, by mail, shall cease to be a member of the Society; subject, however, to reinstatement by the Board of Managers or Executive Committee for good cause shown.

SEC. 9. Any person elected to membership who shall fail to qualify within three months after notice of his election shall be considered to have declined his election; but such term may be extended by the Board of Managers or Executive Committee.

ARTICLE VIII.

FINANCES.

SEC. 1. The fiscal year of the corporation shall be the calendar year commencing January 1st and ending December 31st.

SEC. 2. Neither the Society nor any of its Managers or Officers shall contract any debt which, with existing debts, shall exceed in amount the funds then in the Treasury, except to meet expenditures for which the city is liable, and for which the Society will be reimbursed by warrants from the Comptroller's office.

ARTICLE IX.

AMENDMENTS.

SEC. 1. Amendments to these By-Laws may be proposed, in writing, at any meeting of the Board of Managers, and adopted by unanimous consent of the Managers present, or if such proposed amendment shall fail to receive unanimous consent, the Secretary shall, with the notices of the next meeting, send a copy of it to each Manager and state that it will be brought up for action at such meeting, when it may be passed by a majority vote.

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