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THIRTEENTH 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

1908

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JANUARY, 1909

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Edgar, D.,
Edgar, Herman L. R.,
Edgar, Newbold,
Edgell, George S.,
Edmonds, John W.,
Egerton, Maurice,
Eggeling, Otto,
Ehrich, Howard,
Eidlitz, Robert James,
Elbers, Mrs. Fritz,
Eldridge, Frederick L.,
Eldridge, William T.,
Ellis, William D.,
Ellis, William H.,
Ellsworth, Duncan S.,
Ellsworth, Lincoln,
Emanuel, J. H., Jr.,
Emery, John J.,
Emigh, Mott,
Emmet, C. Temple,
Emmet, Miss Lydia F.,
Emmet, Robert Temple,
Emmons, William,
Endicott, Robert,
English, E. M.,
Eno, John Chester,
Epstean, Edward,
Erbsloh, R.,
Erdmann, Martin,
Erxmeyer, H. F.,
Ettlinger, Louis,
Eustis, John E.,
Evans, Mrs. Cadwalader,
Evans, Richard,
Evarts, A. W.,
Evarts, Sherman,
Fabbri, Alessandro,
Fabbri, Ernesto G.,
Fabbri, Mrs. Ernesto G.,
Fahnestock, Harris C.,
Fahnestock, William,
Fairbanks, Henry P.,
Fallon, John J.,
Falk, Gustav,
Fargo, James C.,
Farlie, A.,
Farnham, Paulding,
Farrelly, T. Charles,
Farrington, Harvey,
Fearing, George R.,
Fearon, J. S.,
Fellowes, Cornelius,
Fennell, George W.,
Ferguson, Harry L.,
Fernstrom, H.,
Field, William B. Osgood,
Field, Mrs. William Osgood,
Fielding, Howard B.,
Fischer, William H.,
Fisher, L. G.,
Fisk, Harvey Edward,
Flagler, Harry Harkness,
Flint, Austin, Jr.,
Flower, Anson R.,
Flower, Frederick S.,
Fohr, Franz,
Foot, James D.,
Forbach, Charles,
Ford, Miss Lesta,
Fordyce, John A.,
Foster, Edward W.,
Foster, Giraud,
Foster, J. Hegeman,
Foster, Macomb G.,
Foster, Scott,
Fowler, Thomas Powell,
Fraser, Alex. V.,
Fraser, Mrs. George S.,
Fraser, Miss S. Grace,
Fraser, William C.,
French, Dr. Cecil,
French, Daniel C.,
French, Mrs. John,
Fried, Samson,
Frissell, A. S.,
Fulda, Dr. Carl,
Fulda, Dr. Clemens,
Fuller, Charles D.,
Fuller, Mrs. Eugene,

* Deceased.

Fuller, Henry D.,
Fulton, John, Jr.,
Funke, Edmund A.,
Futterer, Charles F.,
Ganz, Anthony,
Garrett, John W.,
Gautier, Dudley G.,
Gay, Joseph E.,
Geisenheimer, Theodore,
Gelbach, Dr. R. William,
Geer, Mrs. Walter,
Gerard, Mrs. James W.,
Gerli, Emanuel,
Gerrish, John Brown,
Gerry, Peter G.,
Gerster, Dr. Arpad G.,
Gilbert, Clinton,
Gilsey, Henry, Jr.,
Glazier, Henry S.,
Glintenkamp, Henry J.,
Glyn, W. E.,
Goadby, W. H.,
Goddard, Frederic N.,
Goetz, Carl,
Godfrey, Mrs. E. D.,
Godwin, Harold,
Goebel, Richard A.,
Goll, Edward,
Goldschmidt, S. A.,
Goodhue, Charles E.,
Goodhue, Mrs. S. C.,
Goodridge, Mrs. F. G.,
Goodwin, A. C.,
Gotthelf, Charles,
Gotthelf, Herman,
Gotthold, Frederic,
Gould, Charles A.,
Gould, Charles W.,
Gould, Edwin,
Gould, George H.,
Goulden, Joseph A.,
Grant, R. S.,
Graves, William L.,
Greeff, Ernest F.,
Greene, Gen. Francis V.,
Greenough, John,
Greenwood, Isaac J.,
Greer, Charles.
Gregor, Elmer R.,
Griffith, Daniel J.,
Grinnell, George Bird,
Griscom, Clement, A., Jr.,
Griswold, Chester,
Gross, Frank,
Guggenheim, Simon,
Guilliver, William C.,
Gurnee, Walter S.,
Haensel, Charles W.,
Haight, Charles S.,
Haines, Charles D.,
Haines, Henry F.,
Hallock, Charles P.,
Halls, William, Jr.,
Halstead, Miss L. P.,
Hamersley, Miss C. L.,
Hamersley, Louis Gordon,
Hamill, P. J.,
Hamilton, Miss Adelaide,
Hamilton, Miss Elizabeth Stewart,
Hammond, James B.,
Hammond, Mrs. John Henry,
Hanson, Prof. Harry D.,
Harbeck, Charles T.,
Hard, Anson W.,
Hard, Mrs. Anson W.,
Hardenbergh, Mrs. John A.,
Hardenbergh, T. E.,
Harmon, Mrs. Clifford,
Harper, Lathrop C.,
Harrison, George L., Jr.,
Harvey, Eli,
Hasslacher, Jacob,
Hastings, Mrs. Thomas,
Hatfield, Thomas F.,
Havemeyer, F. C., Jr.,
Havemeyer, H. O., Jr.,
Havemeyer, J. C.,
Havemeyer, T. A.,
Haven, George G., Jr.,
Haven, J. Woodward,
Havens, Albert G.,
Hawe, Matthew,
Haynes, William De Forest,
Hecker, Anton J.,
Hedges, Job E.,
Heiman, Abraham,
Heiman, E.,
Heiman, Mrs. Sophie,
Heintz, John C.,
Heitemeyer, Clemens,
Held, Dr. R. Johnson,
Hencken, Hancke,
Hendricks, Francis,
Hengstler, Louis,
Henriques, Dr. H. A.,
Hermann, Ferdinand,
Herrman, Mrs. Esther,
Herter, Dr. Christian A.,
Herzog, Lewis,
Hess, Selmar,
Heumann, George M.,
Heumann, Michael,
Hewitt, Mrs. Abram S.,
Hewitt, Herbert H.,
Hill, E. B.,
Hill, Henry,

* Deceased.

Hills, Dr. Alfred K.,
Hilyard, George D.,
Hinchman, Walter,
Hirsch, Charles S.,
Hiss, Philip,
Hitchcock, Center,
Hochschild, Berthold,
Hodenpyl, Anton G.,
Hoe, Richard M.,
Hoe, Mrs. Richard M.,
Hoe, Mrs. Robert,
Hoffman, Mrs. E. A.,
Hogan, William,
Hogg, James,
Holbrook, Mrs. F. S.,
Holden, Edwin R.,
Holden, George A.,
Hollins, Henry B.,
Hollister, H. H.,
Holt, Henry,
Hooley, Edwin S.,
Hoormann, George,
Hopf, M. G.,
Hoppin, Hamilton L.,
Hoppin, Williaim W., Jr.,
Hoskier, H. C.,
Howe, Wirt,
Howell, George C.,
Howland, Henry E.,
Howland, Mrs. Henry E.,
Hoyt, Colgate,
Hoyt, Walter S.,
Hoyt, Gerald L.,
Hoyt, Goold,
Hoyt, Mrs. Jesse,
Hughes, Charles E.,
Humphreys, Mrs. Edward Walsh,
Huntington, Rev. W. R.,
Hupfel, J. Christopher G.,
Hussey, William H.,
Husted, Miss M. Katharine,
Husted, Seymour L., Jr.,
Hutchins, Augustus Schell,
Hutchinson, Cary T.,
Hutter, Karl,
Huyler, John C.,
Hyde, Augustus L.,
Hyde, B. T. Babbitt,
Hyde, Clarence M.,
Hyde, Dr. Frederick E.,
Inches, George B.,
Ijams, J. T.,
Irvin, Mrs. Richard,
Iselin, Adrian, Jr.,
Iselin, C. Oliver,
Iselin, Columbus O'Donnell,
Iselin, Miss Georgine,
Iselin, John H.,
Iselin, William O'Donnell,
Isham, Charles H.,
Isham, Samuel,
Ivory, L. C.,
Jackson, Frederic Wendell,
Jackson, Dr. George Thomas,
Jackson, R. G.,
Jackson, Samuel Macauley,
Jacob, Lawrence,
Jacobi, Dr. A.,
Jacobus, John S.,
Jacquelin, Herbert T. B.,
Jacquelin, John H.,
James, Arthur Curtiss,
James, Dr. Robert C.,
James, Dr. Walter B.,
Janeway, Dr. Edward G.,
Jenkins, William B.,
Jennings, Frederick B.,
Jennings, Philander R.,
Jennings, Walter,
Jester, Claude W.,
Johnson, F. Coit,
Johnson, Guy B.,
Johnston, J. Herbert,
Johnston, Samuel D.,
Johnston, William J.,
Joline, Adrian Hoffman,
Jones, Miss Beatrix,
Jones, Mrs. Cadwalader,
Jones, H. Bolton,
Jones, Dwight A.,
Jones, Lewis Q.,
Judson, H. J.,
Kaegebehn, Alfred,
Kaegebehn, Miss Bertha K.,
Kaegebehn, Otto,
Kahn, Louis,
Kahn, Otto H.,
Kallman, Charles,
Kamena, William L.,
Kane, John Innes,
Kane, Miss Louisa Langdon,
Kaufmann, I.,
Keech, Frank B.,
Kelley, Austin P.,
Kellogg, Mrs. Charles,
Kelly, Eugene,
Kemp, Arthur T.,
Kennedy, Edward G.,
Kent, Edwin C.,
Keppel, Frederick,
Keuffel, W. G.,
Keuffel, Wilhelm,
Kidder, James Hathaway,
Kiel, C.,
Kilian, Henry,
Kimball, Alfred R.,

* Deceased.

King, Edward,
King, James Gore,
King, Mrs. Leroy,
King. N. K.,
King, William F.,
Kinney, Morris,
Kitching, Frank W.,
Kittredge, Samuel Dana,
Kitz, Joseph,
Klaw, Marc,
Klee, Benjamin,
Klein, Alfred J.,
Knapp, John M.,
Knoedler, Roland F.,
Koenig, John J.,
Koester, Carl F.,
Kogge, A. H.,
Kohlman, Charles,
Kolb, Gustave F.,
Krisch, Gustav,
Krunscheid, C. D.,
Kugelmann, Charles,
Kuhne, Percival,
Kunhardt, Henry R.,
Kuper, Jacob E. W.,
Kuttroff, Adolf,
Lacombe, Hon. E. Henry,
Ladew, Mrs. Edward R.,
Lagai, Dr. George,
Lambert, Dr. Alexander,
Lambert, Dr. A. V. S.,
Lambert, Dr. Samuel W.,
Lamont, Mrs. Daniel S.,
Landon, Mrs. E. H.,
Landon, Francis G.,
Lane, Edward V. Z.,
Lane, James Warren,
Lange, J. D.,
Langeloth, J.,
Langdon, Woodbury G., Jr.,
Langmann, Dr. Gustav,
Langspecht, Carl,
Latting, Charles P.,
Laudauer, I. N.,
Lawrence, John Burling,
Lawrence, Newbold T.,
Lawrence, Townsend,
Lawrence, Walter Bowen,
Lawrence, W. V.,
Ledoux, Dr. Albert R.,
Lee, Mrs. Frederic S.,
Lee, Prof. Frederic S.,
Lee, J. Bowers,
Lee, William H. L.,
Lefferts, Marshall C.,
Leitner, Jacob,
Lesher, A. L.,
Letkemann, H. V.,
Levy, Emanuel,
Lewis, Frederic Elliott,
Lewis, Percy Pyne,
Lewis, Wadsworth Russell,
Lewis, Dr. William J.,
Lewisohn, Adolph.,
Libenau, Albert,
Liebertz, Joseph,
Lincoln, Lowell,
Linde, J. E.,
Litchfield, E. Hubert,
Litchfield, Edward H.,
Littauer, William,
Livingston, William S.,
Lobenstine, William C.,
Lord, Mrs. George DeForest,
Lowell, Miss Carlotta Russell,
Lowell, James B.,
Low, Ethelbert Ide,
Luchsinger, Jacques,
Lueder, A.,
Lusk, Prof. Graham,
Luttgen, Walther,
Lyman, Frank,
McAlpin, Mrs. Charles W.,
McAlpin, George L.,
McClure, S. S.,
McKim, Rev. Haslett,
McKim, John A.,
McKim, LeRoy,
McKinney, Glenn Ford,
McLean, James,
McLean, Marshall,
McVickar, Edward,
Mackel, Adolph,
Maclay, Mrs. Robert,
Macy, George H.,
Maenner, F.,
Maerlender, Edward H.,
Magee, John,
Mager, F. Robert,
Mahl, William,
Mairs, George H.,
Mali, Pierre,
Manewal, William,
Mann, William d'Alton,
Mapes, Daniel, Jr.,
Mapes, Ernest S.,
Markoe, Dr. J. W.,
Marling, Alfred E.,
Marlor, Henry S.,
Marsh, C. P.,
Marshall, Charles H.,
Marston, Edwin S.,
Martin, James F.,
Martin, William R. H.,
Martinez, Migual R.,
Maslen, Richard R.,

* Deceased.

Mathews, Thomas,
Matthiessen, Miss Marie,
Maxwell, Robert,
Mehl, Henry,
Mehltretter, Charles F.,
Meissner, Carl A.,
Mellen, Charles S.,
Merkel, August,
Merritt, Henry C.,
Meyer, Charles
Meyer, George W.,
Meyer, William,
Meyrowitz, Emil B.,
Middlebrook, Frederick,
Mikkelsen, Mrs. M. A.,
de Milhau, Louis John,
Milbank, Albert J.,
Miller, Mrs. Charles E.,
Miller, Roswell,
Milliken, S. M.,
Mills, Abraham G.,
Mills, Andrew,
Mills, D. O.,
Milmine, C. E.,
Minturn, James F.,
Mitchell, F. Kendall,
Mitchell, William
Moench, Hugo,
Moffat, George Barclay,
Montant, Alphonse,
Montgomery, Richard M.,
Moore, Casimir de R.,
Moore, Charles Arthur, Jr.,
Moore, Miss Faith,
Moore, Dr. John W.,
Moore, Miss K. T.,
Moos, August,
Morant, Harry,
Morawetz, Victor,
Morgan, Miss Annie T.,
Morgan, Miss C. L.,
Morgan, Edwin D.,
Morgan, George E.,
Morgan, George H.,
Morgan, Mrs. J. B.,
Morgan, Mrs. J. Pierpont,
Morgan, Junius S.,
Morgan, Mrs. Junius S.,
Morgan, Dr. Thomas H.,
Morris, Dave H.,
Morris, Fordham,
Morris, John Jacob,
Morris, Dr. Lewis Rutherfurd,
Morro, Edward,
Morse, Charles H.,
Mortimer, Richard,
Morton, A. L.,
Morton, Mrs. Henry Samuel,
Mott, Henry C.,
Mott, John Bowen,
Mott, Jordan J., Jr.,
Mueller, Charles F.,
Muhlfeld, Frank J.,
Muller, William,
Munroe, Henry W.,
Murgatroyd, John,
Myers, Joseph G.,
Naegeli, Robert,
Neilson, Dr. Howard S.,
Nelson, James W.,
Nesmith, James,
Neumer, Ferdinand,
Nichols, Acosta,
Nichols, John W. T.,
Niles, Robert L.,
Nixon, John,
Noble, Alfred,
Norrie, A. Lanfear,
Norton, George F.,
Noyes, Mrs. Henry D.,
O'Connell, Michael,
O'Connor, P. C.,
Ogden, Charles W.,
Ohmeis, John,
Olcott, Dudley 2d,
Olsen, Charles P.,
Olyphant, Robert,
Olyphant, Robert M.,
Onativia, John Victor,
O'Rourke, John F.,
Osborn, Mrs. Henry Fairfield,
Otto, Gustav,
Outerbridge, Dr. Paul,
Ovens, Latham J.,
Overton, Dr. Frank,
Paganelli, Raphael,
Paganelli, T. Richard,
Palmer, S. S.,
Parpart, William E.,
Parsons, Edwin,
Parsons, Mrs. Edwin,
Parsons, H. de B.,
Parsons, John E.,
Parsons, Miss Mary,
Parsons, William Barclay,
Parsons, William H.,
Passet, August,
Paterson, R. W.,
Patteson, Charles S.,
Paul, John J.,
Paul, W. A. O.,
Peabody, Stephen,
Pell, Stephen H. P.,
Pendleton, Francis Key,
Penfold, William Hall,
Penniman, George H.,

* Deceased.

Percival, L. A. D.,
Perkins, George W.,
Perkins, Robert P.,
Peters, Charles G.,
Peters, Samuel T.,
Peters, William Richmond,
Pfeiffer, George,
Pfizer, Charles, Jr.,
Pickhardt, Carl,
Piel, Gottfried,
Piel, Michael,
Pierce, Henry Clay,
Pierrepont, Miss Anna Jay,
Pierson, Gen. J. Fred,
Pike, R. W.,
Pinchot, Gifford,
Pitt, Henry W.,
Platt, Frank H.,
Platt, Miss Marion Erskine,
Plympton, Gilbert M.,
Polesie, Max,
Pollock, George E.,
Poor, Henry V.,
Porter, Clarence,
Porter, William L.,
Post, Abram S.,
Post, Edward C.,
Post, George B., Jr.,
Post, Mrs. H. A. V.,
Post, William H.,
Potter, Miss Blanche,
Potter, Edward Clarkson,
Potter, Frederick,
Potter, Miss Martha,
Potts, William Brevoort,
Pratt, George D.,
Prentice, John Hill,
Prentiss, George Lewis,
Press, T. Channon,
Prime, Miss Cornelia,
Prince, Edward S.,
Prince, Prof. J. Dyneley,
Pryer, Charles,
Pulitzer, Mrs. Joseph,
Putnam, William A.,
Pyle, James Tolman,
Pyne, Mrs. M. Taylor,
Quintard, Dr. Edward,
Radford, Harry V.,
Ramm, C.,
Randall, Frank E.,
Randolph, Edmund D.,
Randolph, William W.,
Ranft, Richard,
Rapallo, Edward S.,
Rath, Robert J.,
Rathborne, Richard C.,
Rauch, William,
Read, William A.,
Redmond, Miss E.,
Redmond, Henry S.,
Reed, Charles,
Reimer, Otto Eugene,
Reincke, E. A.,
Reinhardt, George N.,
Renter, August,
Reynolds, E. B.,
Reynolds, James Bronson,
Rhinelander, Charles E.,
Rhinelander, Frederic W.,
Rhinelander, Miss Serena,
Richard, Edwin A.,
Richards, E. O.,
Richmond, Watts L.,
Riker, John L.,
Riker, Samuel,
Ripley, H. Dillon,
Ripley, Julian A.,
Ripley, Louis A.,
Ritter, Frederick,
Rives, George L.,
Robbins, Chandler,
Robertson, Mrs. Fanny P.,
Robertson, R. H.,
Robinson, Edward,
Robinson, Eli K.,
Robinson, G. H.,
Robinson, G. N.,
Robinson, Henry A.,
Robison, William,
Rockwood, William H.,
Roe, Charles F.,
Roe, Frank O.,
Roe, Irving L.,
Roelker, Alfred,
Rogers, E. L.,
Rogers, James H.,
Rokenbaugh, Henry S.,
Romaine, W. Tyson,
Roosevelt, W. Emlen,
Root, Elihu,
Rose, John J.,
Rossiter, Arthur W.,
Rossiter, E. V. W.,
Roth, Frederick G. R.,
Rothwell, James E.,
Rowland, Thomas,
Rudolph, John J.,
Rungius, Carl,
Runyon, Carman R.,
Runyon, E. W.,
Ruppert, Jacob,
Ruppert, Mrs. Jacob,
Ruperti, Justus,
Russell, Archibald D.,
Ryan, J. D.,

* Deceased.

Ryle, Arthur,
St. John, F. L.,
Sackett, Clarence,
Sackett, Miss Gertrude T.,
Sackett, Mrs. S. E.,
Saenger, Charles J.,
Sage, John H.,
Sage, Mrs. Russell,
Sampson, Charles E.,
Sanchez, Eduardo,
Satterlee, Mrs. H. L.,
Sauter, Frederick,
Schaefer, Andreas F.,
Schaefer, Henry,
Schanck, George E.,
Schang, Frederick,
Schaue, C. F.,
Schefer, Carl,
Schieffelin, Mrs. H. M.,
Schieffelin, William Jay,
Schilling, Robert H.,
Schirmer, Gustav,
Schirmer, Rudolph E.,
Schmandt, G.,
Schmidt, F. Leopold,
Schneider, G. E.,
Schniewind, F.,
Scholle, A. H.,
Schreyvogel, Charles,
Schultze, Charles,
Schultze, Fred,
Schultze, John S.,
Schumacher, Charles,
Schuyler, Miss Louisa Lee,
Schwarz, Henry F.,
Scott, Hon. Francis M.,
Scott, William,
Scribner, Arthur H.,
Scrymser, James A.,
Sedgwick, Robert,
See, A. B.,
Seggel, Ludwig F.,
Seligman, Alfred L.,
Seligman, Jefferson,
Seton, Alfred,
Sewall, Fred W.,
Sexton, Lawrence E.,
Seybel, Daniel E.,
Shapiro, D.,
Shaw, Charles Herbert,
Shaw, James G.,
Sheets, Dr. E. A.,
Sheffield, James R.,
Sheldon, George R.,
Sheldon, William C.,
Shipway, John H.,
Shoemaker, Henry W.,
Shurtleff, Roswell Morse,
Sibley, Mrs. H. W.,
Siegel, Jacob,
Silleck, Henry G., Jr.,
Silleck, Mrs. Henry G., Jr.,
Silliman, Harper,
Simmons, Joseph F.,
Simpson, John W.,
Simpson, William,
Skeel, Frank D.,
Skidmore, William L.,
Slade, Francis Louis,
Smiley, Daniel,
Smillie, Charles F.,
Smillie, James D.,
Smith, Dr. A. Alexander,
Smith, Augustine J.,
Smith, Arthur,
Smith, F. M.,
Smith, H. Sanborn,
Smith, James,
Smith, Lucius H.,
Smith, Nathaniel S.,
Smith, Philip S.,
Smith, Robert W.,
Smith, Dr. Samuel,
Smith, William Alexander,
Smithers, Charles,
Smithers, F. S.,
Snow, C. G.,
Soltmann, E. G.,
Sorchon, Mrs. Victor,
Spalding, Keith,
Spear, James, Jr.,
Spedden, Frederic O.,
Spencer, Lorillard,
Spiegelberg, F.,
Spitzner, George W.,
Spofford, Mrs. J. L.,
Spring, Miss Anna Riker,
Spurr, E. W.,
Squibb, Charles F.,
Squibb, Dr. Edward H.,
Stafford, William Frederick,
Standish, Myles,
Stanton, John R.,
Starr, Louis Morris,
Stebbins, James H.,
Stecker, Adam A.,
Steers, Henry,
Steeves, John F.,
Steil, George H.,
Steinbeck, Edward,
Steinmetz, John A.,
Steljes, George H.,
Stephens, Olin J.,
Stern, Isaac,
Stern, Vesty J.,
Stevens, Alexander H.,

* Deceased.

Stevens, Frederic W.,
Stevens, Richard,
Stevens, Theodosius F.,
Stevenson, Paul Eve,
Stewart, James,
Stewart, William R.,
Stillman, Miss Charlotte R.,
Stillman, James A.,
Stillman, Thomas B.,
Stimson, Dr. Daniel M.,
Stoeger, A. T.,
Stokes, H. B.,
Stone, Walter King,
Stout, Andrew V.,
Stout, Joseph S.,
Stow, George G.,
Strange, A. B.,
Straus, Miss Dorothy,
Strauss, Frederick,
Streat, James,
Streeter, D. D., Jr.,
Strong, Theron G.,
Sturges, Henry C.,
Stuyvesant, Rutherfurd,
Sullivan, Mrs. James,
Sutton, Woodruff,
Swan, Alden S.,
Swenson, S. A.,
Taber, Miss Mary,
Taft, Henry W.,
Talcott, James,
Talmage, Mrs. E. T. H.,
Tatham, Charles,
Tatum, A. H.,
Taylor, Dwight W.,
Taylor, George,
Taylor, Mrs. Henry Osborn,
Taylor, Henry R.,
Taylor, Herbert C.,
Taylor, James B.,
Taylor, Knox,
Taylor, Lloyd,
Taylor, Moses,
Taylor, Stevenson,
Tenney, C. H.,
Terry, John T.,
Thacher, Mrs. George W.,
Thacher, Thomas,
Thayer, Mrs. Ethel R.,
Thayer, Harry Bates,
Thomas, Dr. Allen M.,
Thomas, Seth E.,
Thorne, Jonathan,
Thorne, Newberry D.,
Thorne, Mrs. W. V. S.,
Thorne, W. V. S.,
Tietjen, John H.,
Tiffany, Louis C.,
Tilford, Henry M.,
Tilt, Benjamin B.,
Tilton, Joseph W.,
Timken, J. Henry,
Timmermann, Henry G.,
Tod, J. Kennedy,
Todd, H. H.,
Tousey, William,
Townsend, Edwin S.,
Townsend, Isaac,
Townsend, J. Henry,
Townshend, John,
Tows, Coe Downing,
Tracy, Thomas,
Trask, Spencer,
Travelli, Mrs. Charles I.,
Trostel, Ferdinand,
Trowbridge, Frederick K.,
Trostel, Ferdinand, Jr.,
Truax, Hon. Charles H.,
Truslow, T. Brooks,
Tuckerman, Alfred,
Tuckermann, Paul,
Turnure, Mrs. Arthur,
Turnure, George E.,
Tweddell, William H.,
Underwood, William Lyman,
Upmann, Carl,
Valentine, Dr. William A.,
Van Beuren, Frederick T., Jr.,
Van Cortlandt, Augustus,
Vanderbilt, Alfred G.,
Vanderpoel, Mrs. John A.,
Van der Smissen, Dr. G. J.,
Van Emburgh, D. B.,
Van Nest, Mrs. Alexander T.,
Van Nest, G. Willett,
Van Norden, Theodore Langdon,
Van Norden, Warner M.,
Van Winkle, Edgar B.,
Van Wyck, William,
Vecchio, Louis,
Viele, Herman K.,
Victor, A.,
Vogel, Herman,
Von Dreele, William H.,
Waddington, George,
Wadsworth, Clarence S.,
Wadsworth, W. P.,
Wagner, Otto,
Wagner, H. William C.,
Wagstaff, C. Du Bois,
Wainwright, J. Howard,
Walcott, Frederic C.,
Walker, George L.,
Walker, George W.,
Waller, Robert, Jr.,
Walsh, Samuel A.,

* Deceased.

Walter, F. E.,
Wanninger, Charles,
Warburg, Paul M.,
Ward, Artemas,
Ward, Mrs. George Cabot,
Ward, Henry C.,
Ward, J. Q. A.,
Wardner, Henry Steele,
Wardwell, William T.,
Warren, Mrs. J. Hobart,
Warren, Lloyd,
Waterbury, John I.,
Watson, Charles F.,
Watson, Rev. J. Henry,
Weatherbee, Edwin H.,
Weaver, R. H.,
Webb, F. Egerton,
Webb, Dr. W. Seward,
Weber, Charles,
Weeks, James,
Weithmann, Julius,
Wells, Oliver J.,
Wendell, Evert Jansen,
Wendell, Gordon,
Wendell, Mrs. Jacob,
Wertheim, H. P.,
Westover, M. F.,
Wetmore, Edmund,
Wettlaufer, Otto C., Jr.,
Wheeler, Everett P.,
Wheelock, Mrs. G. G.,
White, Alain C.,
White, Horace,
White, John Jay,
White, Leonard D.,
White, S. V.,
White, William W.,
Whitehouse, J. Henry,
Whitehouse, William F.,
Whiting, Dr. Charles A.,
Whiting, Miss Gertrude,
Whiting, Giles,
Whitman, Clarence,
Whitman, William, Jr.,
Whitney, Miss Dorothy,
Whitney, Miss E. C.,
Whitridge, F. W.,
Wickersham, George W.,
Wiener, Felix F.,
Wildersinn, Ernest,
Wilkins, F. H.,
Willets, John T.,
Williams, Mrs. G. G.,
Williams, Richard H., Jr.,
Williams, Mrs. Percy H.,
Williams, Thomas,
Williams, Waldron,
Willoughby, Miss Mary Carew,
Wills, Charles T.,
Wilson, Dr. Edmund B.,
Wilson, George T.,
Wilson, Henry R.,
Wiltsee, Ernest,
Winant, Frederick,
Winckelbach, L. O.,
Winthrop, Egerton L., Jr.,
Winthrop, Mrs. Egerton L., Jr.,
Winthrop, Robert Dudley,
Wisloh, John G.,
Wisloh, Theodore W.,
Wisner, Charles,
Witherbee, Frank S.,
Witthaus, Dr. Rudolph A.,
Wolff, Emil,
Wood, Arnold,
Wood, Gilbert Congdon,
Wood, J. Walter,
Wood, William Congdon,
Woodcock, Edwin,
Woodhouse, J. S.,
Woodward, James T.,
Worcester, Wilfred J.,
Wright, J. Dunbar,
Wright, Mrs. J. Hood,
Wright, John Howard,
Wright, Mrs. Mabel Osgood,
Wyckoff, Dr. Peter Brown,
Young, A. Murray,
Young, George W.,
Young, John Alvin,
Young, John W.,
Zabriskie, Andrew C.,
Zang, Charles,
Zinsser, August.

* Deceased.

Corresponding Members.

Gilfedder, T. P.,
Johnston, Sir Harry H.

Summary of Membership.

Benefactors	1
Founders in Perpetuity	3
Founders	23
Associate Founders	13
Patrons	38
Life Members	189
Annual Members	1,397
Corresponding and Honorary Members	14
	1,678

Qualifications for Regular Membership.

Annual Members	$ 10	Associate Founders	2,500
Life Members	200	Founders	$ 5,000
Patrons	1,000	Founder in Perpetuity	10,000
		Benefactor	25,000

Form of Bequest.

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

.....

.....

PORTION OF THE ELK HERD.

REPORT OF THE EXECUTIVE COMMITTEE

TO THE BOARD OF MANAGERS

IN NOVEMBER, 1909, the Society will celebrate the Decennial of the opening of the Park in an appropriate manner It is really a great achievement that, in the short space of ten years, through the loyal cooperation of our members, of the city authorities, and of the able staff of experts, a zoological park ranking among the first in the world has been created. The Administration Building will then be opened, and for the first time members will find an attractive meeting place and special accommodations when visiting the Park.

There are three great objects to which this Society must especially devote attention and effort during the coming year, as follows:

Endowment Fund.—An Endowment Fund for the perpetuation of the Society, similar to that enjoyed by the Metropolitan Museum of Art, and the American Museum of Natural History, is absolutely essential. The welfare of the Society now depends on the annual dues and the individual efforts of its officers. Certain contingencies might arise which would jeopardize what should be absolutely secure, namely, its perpetuation and service to the community. This can only be rendered certain through an adequate Endowment Fund. The Executive Committee, during the coming year, will attempt to raise $200,000 toward a fund which should ultimately be $1,000,000.

Conservation of Wild Life.—From the first, preservation of the wild life of North America has been one of the avowed objects of the Society. The officers of the Society, especially our Director, Dr. William T. Hornaday, and our Secretary, Mr. Madison Grant, have been extremely active in devising and securing effective legislation in various parts of the United States, in Alaska, in Newfoundland, and even in British Columbia, for the preservation of wild life. Indirectly the Society has also, through its officers, been instrumental in the great movement for the Bison Preserves of Oklahoma and Montana. The urgency of this movement increases with the rapidly increasing destruction of game in all parts of our great country, and with it increases the responsibility of the Society, both officially and through

its individual membership, to make renewed efforts for the imperiled natural life, the loss of which to the country will be little short of a national calamity. That this is not an overstatement is proved by the *universal* protest against the destruction of the Bison, and by the truly national movement and sentiment to preserve this noble animal.

Zoological Research.—This is the third great object to which the energies of the Society should especially be devoted. Already an enviable reputation has been made through the splendid publications in natural history of Dr. William T. Hornaday, Mr. Madison Grant, Mr. C. William Beebe, Mr. R. L. Ditmars and Mr. Charles H. Townsend. These publications have been based partly on the collections brought together by the Society in the Park and Aquarium, partly as the result of travel, and partly as the result of remarkable experiments carried on in the Park itself. Of the latter, the experiments of Mr. C. William Beebe on the plumage of birds, as published in *Zoologica,* our scientific periodical, have attracted world wide attention. A number of persons have thereby become interested in the future work of the Society, and have contributed generous sums to carry on this work.

A distinct line of investigation of an especially humane character is that which the Society has been conducting from the very first on the life, health and happiness of its captive animals of all kinds. These investigations are now being assembled in two important volumes, which will be published as part of the celebration of the Decennial of the Society, from the Zoological Park and the Aquarium respectively.

The members of the Society are individually and collectively invited to aid in these great movements, which will not in any way interfere with, but rather will tend to increase the beauty and attractiveness as well as permanence of the Zoological Park itself, which, it is always to be remembered, is the first object for which the Society was formed. The buildings of the Park must be extended, the collections must be made more comprehensive, the natural beauties of the Park must be preserved, the educational value of the collections to the people of the City of New York must be constantly kept in mind.

With the fulfilment of these ideals, which have been before us from the beginning, and with the establishment of an Endowment Fund, the Society will begin its second decennial with confidence in another decade of still greater usefulness.

During the past year the Zoological Park and the Aquarium have grown in popularity with the public, as is proved by the

fact that 1,413,677 people visited the Zoological Park, and 2,536,147 visited the Aquarium, making the remarkable total of visitors to the two institutions of 3,949,824, a total increase over the attendance for 1907 of 542,390. It can be safely stated that the attendance at the Aquarium for the year 1908 is the largest attendance of any scientific institution in the world. The cost to the City for providing amusement, recreation and scientific instruction to this great number was about five cents for each visitor.

During the past year the most important permanent improvement comprised the completion of the Elephant House; the partial construction of a very extensive and important series of yards for its inhabitants; the completion of the Concourse and Approach; completion of the Concourse Entrance on Pelham Avenue; completion of the new Soda Pavilion, and of the walks and retaining walls surrounding it; and the commencement of the work on the Administration Building.

The membership of the Society on January 1, 1909, showed a slight increase over 1907, and was as follows:

Benefactors and Founders	27
Associate Founders	13
Patrons	38
Life Members	189
Annual Members	1,397
Corresponding and Honorary Members	14
Total Membership	1,678

As against a total of 1,624 in 1907.

FINANCES.

Animal Fund.—During the year 1908 the receipts for the Animal Fund have been as follows:

Special subscriptions	$4,230.00
Received from sales of animals	1,561.50
Received from Park privileges	19,779.93
Balance from the year 1907	1,325.33
Total receipts	$26,896.76
During the year there was expended for animals the sum of	13,678.01
Balance January 1, 1909	$13,218.75

Income Account.—During the year the Income Account proved inadequate to maintain the work of the Society, and a special subscription, totaling $9,850, was raised among the members of the Board of Managers. On January 1, 1909, this account showed a balance of $6,106.54. An increased membership is necessary to maintain this fund without a deficit.

The Executive Committee decided to ask one hundred members of the New York Zoological Society each for a special contribution of $40 a year, for the years 1909 to 1913, inclusive. This will offset the estimated annual deficit of the Income Account on its present basis. The responses to this request have been most gratifying. The committee also resolved that those subscribing to such Sustaining Membership should have the right to designate a Life Member of the Society, upon the completion of the payments of the subscription for the five years, amounting to $200.

General Fund.—The General Fund shows a balance of $207.80.

Ground Improvement Fund.—On January 1, 1908, there was a balance in the Ground Improvement Fund of $149,757.05, and during the year $65,000 has been appropriated by the City; also, $4,073.44 being the premium on the sale of bonds. During the year the sum of $147,608.25 has been expended, leaving a balance of $71,222.24 available for new construction.

Stokes' Bird Fund.—On January 1, 1909, this fund donated to the Society by Miss Caroline Phelps Stokes for the protection of bird life, showed a balance of income of $519.11. The principal, viz., $3,009.58 is invested in three Illinois Central Railway 4 per cent. Gold Bonds. Through the further generosity of Miss Stokes this fund has been increased to a total of $5,000, and her wishes regarding the use of the income of her fund was expressed in the following very liberal terms:

"I should like to ask that the income of the fund shall be *annually* expended, * * * and I am entirely willing that it should be used in any part of the United States, or our country's possessions, wherever there is the most or special need for enlightenment, or protection of bird life."

Maintenance of the Zoological Park.—The amount provided by the City for the maintenance of the Park for the year 1908, $154,627, was found insufficient to maintain the Park for that year in an adequate manner. In view of that fact the Board of Estimate appropriated the sum of $162,325 for maintenance for the year 1909, which is an increase of $7,698 over the year 1908.

Owing to the increase in the cost of maintenance, by reason of the added charges on account of the Elephant House and other new buildings, this additional appropriation from the City is most timely. It is also proof of the continued confidence of the present City administration in the management of the Park.

Maintenance of the Aquarium.—The amount appropriated by the City for the maintenance of the Aquarium for 1908 was $45,000, which proved sufficient for that year. Owing, however, to the fact that the cost of maintenance at the Aquarium is increasing, the amount of $46,000 has been provided for the coming year, 1909. This action on the part of the authorities is very satisfactory and gratifying to your Committee.

Aquarium Improvement Fund.—The small balance available in this fund in January, 1908, prohibited the making of highly necessary betterments. Therefore, application was made for $5,000 for improvements, the most important of which is a new roof. This application was granted, but the money has not yet been actually placed to the credit of the fund. On January 1, 1909, there was a balance of $441.57 to the credit of the fund. The plans and specifications for the work are now being prepared.

Detailed statements of the above accounts are set forth in the Treasurer's report.

IMPORTANT GIFTS TO THE PARK.

The most important gifts during the year have been: One Sarus crane, presented by Mr. William Rockefeller; one white-tailed deer, presented by Captain H. Blake; one black bear, presented by Mr. Rex Beach and Mr. F. A. Stone; one white-tailed deer, presented by Mr. S. B. Chittenden; one African rock python, presented by Miss Trixie Roderico; one golden baboon, presented by Mrs. Annie Kellogg Dale; one anteater, presented by Mr. Gustav Butnee; eight pheasants, presented by Mr. Clarence Whitman; and donations to the Special Animal Fund as follows: $1,000 from Mr. Charles H. Senff; $500 from Mr. Robert S. Brewster; $500 from Mr. Andrew Carnegie; $500 from Mr. Edward S. Harkness, and $500 from Mr. Nelson Robinson.

A detailed list of subscriptions to the Special Animal Fund will appear in the report of the Director of the Park.

NEW BUILDINGS AND INSTALLATIONS.

The Elephant House, acknowledged to be the finest zoological building in the world, was completed and opened to the public on November 20, 1908.

NEW ADMINISTRATION BUILDING.

The construction of a very extensive and important series of yards for animals, and of walks around the Elephant House, is now in full progress.

The new Soda Pavilion, immediately south of the Aquatic Bird House, has been completed, as well as the walks and retaining walls surrounding it.

The Concourse and Approach have been completed, thus affording direct access for automobiles and carriages to Baird Court and the main animal exhibits of the Park.

Work on the Administration Building is now in progress, and it should be completed by October, 1909. When this building is ready for use, the members of the Society will be provided with special and suitable accommodations in the Park, which heretofore have been lacking. The plans provide for spacious reception rooms and offices, space for the library of the Society, and for the National Collection of Heads and Horns. This building is located on the northeast corner of Baird Court, and completes the plan of that portion of the Park. It will be ready for occupancy about October 1, 1909.

PLANS FOR 1909.

During 1909 the Elephant House Yards and Walks will be completed, in the spring. At the same time the very extensive planting operations planned for the Concourse and Approach to Baird Court will be carried out.

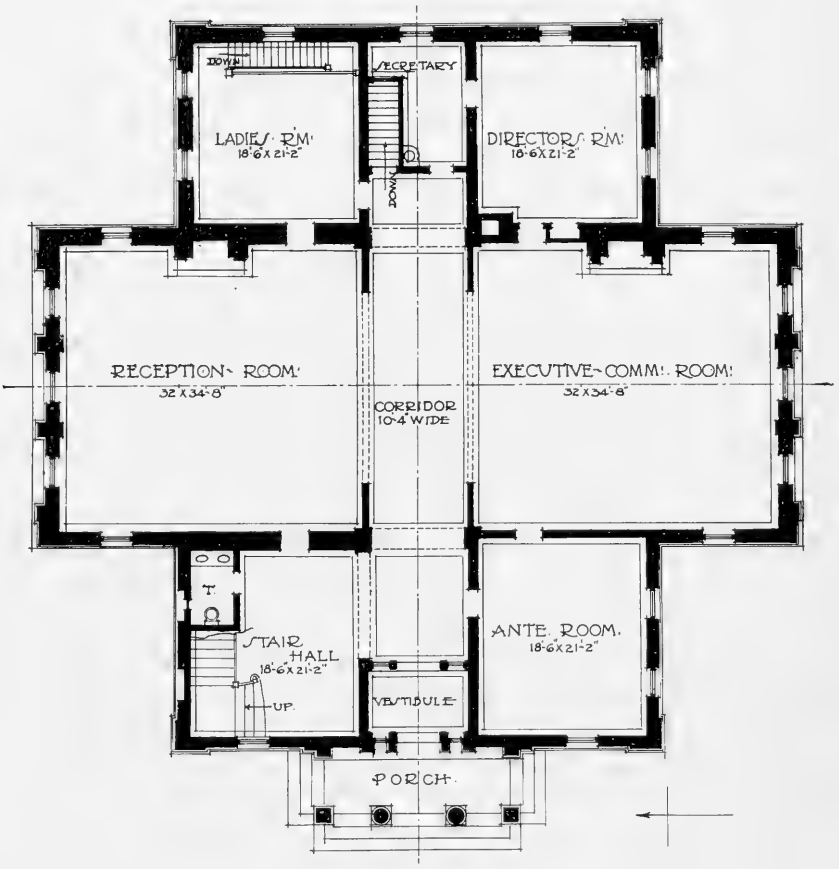
It is hoped that the Society will also be able to carry out the plans for the construction of a Zebra House and Eagles' Aviary, now much needed.

It is the intention of your Committee to endeavor to give the Park a more finished appearance in various details, now that the chief construction work is completed.

ANIMAL COLLECTION.

At this time, in point of total number of specimens in good condition on exhibition, the animal collections of the Zoological Park far exceed the total to be found in any other zoological institution. The summary is as follows:

Mammals	217	species	682	specimens
Birds	563	"	2,615	"
Reptiles and Amphibians	182	"	1,282	"
	962	"	4,579	"

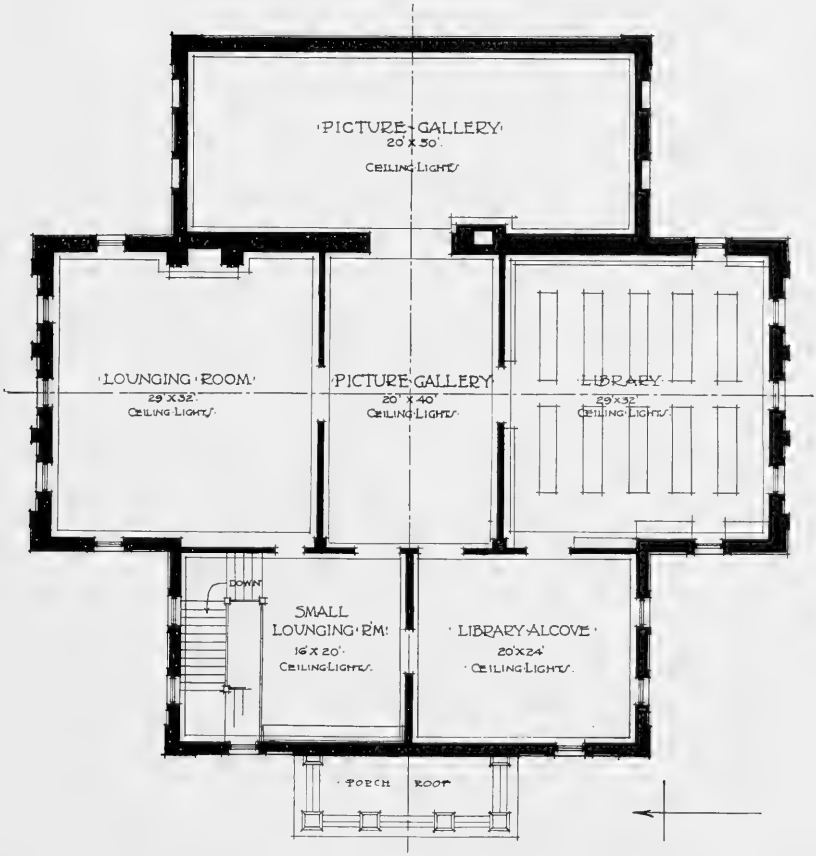


Ground Floor Plan.

GROUND PLANS OF NEW ADMINISTRATION BUILDING.

These figures show an increase over 1907 of 97 species, and 545 specimens.

Over $12,000 has been expended on the purchase of animals during 1908, including one Indian rhinoceros, three ibex, one Grevy zebra, one pair of ostriches, one Malay tapir, three clouded leopards, two imperial pythons, two cassowarys, one chimpanzee, one elephant, one baboon and one markhor. During the year the Animal Fund was replenished by special subscriptions amounting to $4,015, as more particularly detailed in the report of the Director of the Park.



Second Floor Plan.

GROUND PLANS OF NEW ADMINISTRATION BUILDING.

FORESTRY DEPARTMENT.

The most important work of this Department was in the Elephant House Yards, and grading the grounds adjacent to the Concourse and Approach. A great deal of work was done toward the extermination of insects and other tree pests with a fair degree of success, and the care and protection of the Park forests have been continued.

MEDICAL DEPARTMENT.

The statistics of the Medical Department have now reached that stage where reliable deductions may be made on a number of problems connected with the care of wild animals in confinement.

Aside from the medical treatment of diseased animals, much work during the past year has been directed toward determining the effect of close confinement on the various organs of the body, particularly the heart and blood-vessels, kidneys and liver: also toward the purpose of learning to what extent degenerative changes in these organs contribute to the lowering of the resistance of the body forces in various diseases.

No animals of great value have been lost during the past year, and the death-rate has been held down to what appears to be its normal limit. Gastro-enteritis among the hoofed animals, and tuberculosis and "cage paralysis" among the primates, which have occupied so much of the attention of this department in the past, are now, we are happy to say, no longer important factors in the death-rate.

A great deal of interest is now being taken in comparative pathology, and much valuable material from this department has been utilized by various pathological laboratories, among them, The Rockefeller Institute, Health Department of New York City, Boston University School of Medicine, Carnegie Laboratory, and others.

Our veterinarian was delegated by this Society to attend the International Congress on Tuberculosis, held at Washington, D. C., during September, and besides contributing a paper on "Tuberculosis in Wild Animals" to this Congress, he was benefited by observing the very latest methods of dealing with this universal problem.

BRONX PARKWAY COMMISSION.

The Bronx Parkway Commission has, as yet, been unable to obtain from the Board of Estimate and Apportionment, any money to prepare the necessary plans and surveys, which must be completed before any work can be commenced on the Parkway. The Comptroller of the City of New York, to whom the application of the Commission was referred, made a favorable report strongly endorsing the plans of the Commission, but the other members of the Board of Estimate and Apportionment have withheld their consent, on the plea of financial stringency. The protection of the river and the lands along the river valley is absolutely essential to the communities on the banks of the

Bronx River and in Westchester County, and to the existence of the water system of Bronx Park in New York City. No other scheme has been, or can be, devised as economical as the purchase, and acquisition by gift, of the lands along the Bronx Valley, and their dedication to Park purposes. It is probably only a question of time when this project will be carried through.

NEW YORK AQUARIUM.

The New York Aquarium is now on a better basis than ever before, a new sea-water system having made possible the keeping of many kinds of fishes and invertebrates not hitherto exhibited here.

An underground reservoir of 100,000 gallons capacity was filled with pure sea water in July, 1908, since which time the marine species have been kept in healthful condition, numerous delicate forms adapting themselves perfectly to the conditions of captivity. Early in the summer of 1909 it will be possible to stock the tanks with still more attractive examples of sea life, now that the use of the stored sea water is well understood.

This splendid water supply relieves the Aquarium of the handicap under which it formerly operated when salt water had to be pumped from our sadly polluted harbor.

Each year since the Zoological Society took charge of the Aquarium, it has, with the ready cooperation of the City, made that great museum of aquatic life more and more popular with the people. Further improvements are in progress, chiefly in the way of lighting the building, which will add to its attractiveness.

The latest arrivals are a green turtle from the West Indies, weighing 400 pounds, and a collection of fishes from Lake Huron. The collection of tropical fishes, now for the first time successfully wintering at the Aquarium, is very attractive in form. and color.

On the forenoon of September 28, 1908, the Fourth International Fisheries Congress was specially entertained at the Aquarium. Many of the foreign delegates were surprised to find that New York maintained a distinctly larger and better stocked aquarium than is to be found anywhere in Europe. It collects and succeeds in keeping aquatic forms, the exhibition of which is not attempted elsewhere.

NATIONAL COLLECTION OF HEADS AND HORNS.

During the past year many important specimens have been presented to the National Collection of Heads and Horns. The

most important group is the collection of Dr. A. Donaldson Smith, from Somaliland, south of Abyssinia, and also from India. This series contains heads of giraffe, Abyssinian buffalo, rhinoceros, kudu, waterbuck, Indian bison, Indian buffalo, and many other species. It was presented by Mr. George J. Gould.

Mr. E. J. House, of Pittsburgh, has contributed a Grevy zebra, Grant zebra, black rhinoceros, reticulated giraffe and Atlantic walrus. Mr. Henry Disston, of Philadelphia, has presented two pairs of Eland horns, one of which is the world's record pair for length. The Caughnawana Club, of Quebec, has presented a sixty-five-inch moose head; Mr. Wilson Potter of Philadelphia, has given a mountain sheep head from Lower California; Mr. Carl Rungius has given the most southerly moose ever taken, and Mr. Frank Hart, of Doylestown, Pennsylvania, has contributed a fine collection of twelve pairs of rare horns and antlers. Mr. Harry Edwards, of Fairbanks, Alaska, has presented two pairs of antlers of Osborn caribou; Mr. George F. Norton has given tusks of norwhal and Atlantic walrus; Mr. John M. Phillips has contributed an extra large mountain goat head; Mr. Edward P. Larned, an Atlantic walrus skull; Mr. John R. Bradley, an Altai ibex head; and Mr. F. S. Billings, of Woodstock, Vermont, a mountain sheep head.

PUBLICATIONS.

During the year the Annual Report and four Bulletins have been published and sent to all the members of this Society. Brochure, No. II, on the National Collection of Heads and Horns, was prepared and sent out to a selected list of the members of the Society. The special publications are sent free to any member desiring them.

OBITUARY.

The Committee reports with regret that during the past year the following life members have passed away:

Miss Matilda W. Bruce,
Mrs. George W. Collord,
Mr. E. W. Davis,
Mr. Charles R. Henderson,
Mr. J. W. Pinchot,
Mr. George W. Quintard,
Mr. Eugene Schieffelin.

ACKNOWLEDGMENTS.

The continued success of the Zoological Park and the Aquarium has been due in a very great degree to the loyalty and high sense of duty manifested by Director William T. Hornaday and Director Charles H. Townsend, and of their very efficient staffs of curators and assistants. Your committee feels that it has been extremely fortunate in the selection of the personnel of both these departments, and takes this opportunity of expressing its appreciation of their zeal. Your committee also desires to acknowledge the continued interest and aid that it has received from the various City officers, without exception, and especially from His Honor, the Mayor, and the Comptroller, as well as the Park Commissioners, both for the Boroughs of The Bronx and Manhattan, and from their respective staffs of assistants. It is to the various members of these respective staffs due in no small degree that the relations between the municipal authorities and the Zoological Society have continued to be most satisfactory.

Respectfully submitted,

HENRY FAIRFIELD OSBORN, *Chairman*,
MADISON GRANT,
JOHN S. BARNES,
PERCY R. PYNE,
WILLIAM WHITE NILES,
SAMUEL THORNE,
LEVI P. MORTON, *ex officio*.

January 1, 1909.

The following resolution was passed on January 19, 1909, on the occasion of the resignation of Mr. Levi P. Morton as president:

Resolved, That the Board of Managers receive with great regret the resignation of Hon. Levi P. Morton, as president of the New York Zoological Society, an office which he has filled with distinction for twelve years past. The Board of Managers desire to record their warm appreciation of Mr. Morton's interest in the Society, and his generous support of the development of the Zoological Park. They also desire to convey to him their best wishes for his continued good health and welfare.

ENTRANCE TO GRAND CONCOURSE AND BAIRD COURT.

Treasurer's Reports.

For the Year Ending December 31, 1908.

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

General Fund.

Cash in Treasury, January 1, 1908	$1,706.80
RECEIPTS.	
Miscellaneous	1.00
	$1,707.80
EXPENDITURES.	
Income account (transfer)	1,500.00
Cash balance, December 31, 1908	207.80
	$1,707.80

H. R. Mitchell,
Chief Clerk.

Percy R. Pyne,
Treasurer.

January 1, 1909.

Income Account.

Cash in Treasury, January 1, 1908		$114.01
RECEIPTS.		
SPECIAL SUBSCRIPTIONS.		
Lispenard Stewart	$500.00	
F. Augustus Schermerhorn	500.00	
Chas. F. Dieterich	500.00	
Grant B. Schley	500.00	
Andrew Carnegie	500.00	
Samuel Thorne	500.00	
Major W. A. Wadsworth	500.00	
Cleveland H. Dodge	500.00	
Jacob H. Schiff	500.00	
John S. Barnes	500.00	
Geo. F. Baker	500.00	
Nelson Robinson	500.00	
Hugh J. Chisholm	500.00	
Percy R. Pyne	500.00	
Prof. Henry F. Osborn	500.00	
Hugh D. Auchincloss	500.00	
C. Ledyard Blair	250.00	
James J. Hill	250.00	
Frank K. Sturgis	250.00	
Geo. C. Clark	100.00	
Miscellaneous	20.00	8,870.00
General Fund (transfer)	1,500.00	
Stokes bird fund	135.00	
Life membership	600.00	
Annual dues	12,330.00	
Miscellaneous	3.00	
Zoologica	.20	
Aquarium	28.60	14,596.80
		$23,580.81
EXPENDITURES.		
Gartland case	187.66	
Scientific research	132.55	
Game protection	31.15	
Audit of accounts	150.00	
Publications for members	334.24	
Stationery and office supplies	722.84	
Annual Report	1,571.28	
General office expenses	1,738.77	
Library	113.87	
Miscellaneous expenses	986.09	
Photographs and slides	1,292.24	
Treasurer's office expenses	646.65	
Bulletin	1,264.95	
Aquarium	294.64	
Secretary's salary	4,000.00	
Heads, horns and tusks	735.77	
Salary and expenses of librarian	1,200.00	
Engineering expenses	232.27	
Employers' insurance	659.61	
Interest	641.25	
Stokes' bird fund (transfer)	538.44	$17,474.27
Cash balance, December 31, 1908		6,106.54
		$23,580.81

H. R. MITCHELL,
Chief Clerk.

PERCY R. PYNE,
Treasurer.

January 1, 1909.

Animal Fund.

Cash in Treasury, January 1, 1908			$1,325.33
RECEIPTS.			
Special Subscriptions:			
Chas. H. Seuff	$1,000.00		
Robt. S. Brewster	500.00		
Andrew Carnegie	500.00		
Edw. S. Harkness	500.00		
Nelson Robinson	500.00		
G. S. Bowdoin	200.00		
Miss Cora Barnes	200.00		
Henry Phillips	100.00		
Jas. B. Ford	100.00		
John D. Pratt	50.00		
H. C. von Post	50.00		
Zenus Crane	50.00		
Geo. B. Hopkins	50.00		
Oliver G. Jennings	50.00		
J. P. Morgan, Jr.	50.00		
David Lydig	50.00		
Wm. Church Osborn	50.00		
W. R. Coe	50.00		
Miscellaneous	180.00		$4,230.00
Receipts at Park:			
Admissions	9,446.40		
Checking	31.05		
Rents	154.99		
Miscellaneous	147.49		
Sale of Animals	1,561.50		
Rocking Stone Restaurant	700.00		
Privilege Account	9,300,00		21,341.43
			$26,896.76
EXPENDITURES.			
Purchase of Animals:			
Mammals	$9,391.95		
Birds	2,326.58		
Reptiles	890.91	$12,609.44	
Express and other charges		762.77	
Traveling and other expenses		305.80	$13,678.01
Cash balance, December 31, 1908			13,218.75
			$26,896.76

H. R. Mitchell,
Chief Clerk.

Percy R. Pyne,
Treasurer.

January 1, 1909.

Maintenance Fund.

RECEIPTS.

Received from the City account Maintenance Appropriation of $154,627.00 for the year....	$134,591.27	
Balance due from the City account of Maintenance	20,035.73	$154,627.00

EXPENDITURES.

Office supplies and printing	$653.84	
Awnings and shades	290.70	
Uniforms and badges	1,037.50	
Repairs	825.08	
Electrical supplies	78.47	
Postage and telegraph	391.30	
Food for animals	29,405.94	
Ice	154.73	
Fuel	7,979.65	
Medical attendance, animals	360.00	
Drugs and medicines	198.10	
Surgical instruments and appliances	3.10	
Sand and cement	718.30	
General administration	15,715.69	
Maintenance of buildings and care of collections..	43,819.18	
Maintenance and care of grounds.....	43,703.18	
Rubber hose	134.38	
Glass and glaziers' supplies	90.55	
Stable supplies and repairs	92.20	
Tools and hardware	1,732.40	
Miscellaneous supplies	236.73	
Nursery supplies	71.45	
Electric lighting	705.84	
Office furniture and fixtures	284.19	
Plumbing supplies	459.79	
Engineering supplies	40.30	
Paints and oils	1,462.51	
Janitors' supplies	430.10	
Freight and express	668.63	
Nursery stock and seeds	103.38	
Sanitation	670.43	
Lumber	1,151.95	
Telephone service and tolls	616.77	
Mats and floor coverings	59.33	
Fencing and netting	124.98	
Signs and labels	98.33	
Medical attendance, employees	58.00	$154,627.00

H. R. Mitchell,
Chief Clerk.

Percy R. Pyne,
Treasurer.

January 18, 1909.

Ground Improvement Fund.

Showing Status of Appropriation No. 4.

RECEIPTS.

Unexpended balance of appropriation No. 3 brought forward..		$4,106.42
Appropriations by Board of Estimate and Apportionment:		
Available, July, 1904	$275,000.00	
Available, May, 1905	275,000.00	
Available, May, 1906	250,000.00	
Available, May, 1907	100,000.00	900.000.00
Premium on bonds to December 31, 1908		17,306.92
		$921,413.34

EXPENDITURES.

Through Park Department:		
Contract, Conrad Hewitt, Pheasants' Aviary.	$19,546.00	
Contract, Geo. L. Walker Co., glass court Bird House	24,199.00	
Contract, J. V. Schafer, Jr., Co., Baird Court	67,000.00	
Contract, Guidone & Galardi, two toilet bldgs.	8,385.00	
Contract, Peter Kiernan, Camel House	2,800.00	
Contract, Wright & Son, feed barn	15,316.00	
Contract, J. J. Buckley, Public Comfort Bldg.	5,600.00	
Contract, Guidone & Galardi, Small Deer House	41,543.00	
Contract, W. Horne & Co., West Farms Entrance Pavilion	5,008.00	
Contract, Granite steps near Bear Dens	1,569.00	
Contract, J. P. Kane, cement	993.75	
Contract, Brown & Fleming, broken stone	7,437.50	
Contract, August Bans, sewer pipe	333.72	
Contract, D. E. Kennedy, installing electric conduit	1,999.00	
Contract, Leslie McHarg & Co., terrace wall and plaza steps	4,770.00	
Contract, Guidone & Galardi, Boat House	34,235.00	
Contract, J. V. Schaefer, Jr., Concourse ent.	22,108.00	
Contract, J. V. Schaefer, Jr., Concourse and West Approach to Baird Court	39,407.54	
Contract, Wm. Whisten Co., Public Com. Building	16,999.00	
Contract, John H. Devlin, part of judgment on contract dated September 4, 1902, for improving existing roads	710.00	
Contract, F. T. Nesbit Co., Elephant House.	149,975.00	
Contract, Kelly & Kelly, Inc., Soda Pavilion	7,679.00	
Contract, J. B. Malatesta, Concourse sidewalks	13,699.00	
Contract, J. V. Schaefer, Jr., Admin. Bldg.	73,328.00	
Contract, McHarg-Barton Co., Ele. Yd. fences	13,700.00	
Miscellaneous expenditures through Park Department	11,992.01	590,332.52
Carried forward		$590,332.52

Brought forward		$590,332.52
By the Zoological Society:		
Improvements West Approach to Baird Court	$1,306.92	
Refreshment pavilion	87.50	
Storage shed	491.69	
Mountain Goat Enclosure	1,498.23	
Pheasants' Aviary	2,113.42	
Reconstruction of walks	17,975.72	
Forestry and planting	56,153.97	
Guard rails	7,068.74	
Ostrich and Mammal House walks and yards	1,757.30	
Miscellaneous ground improvement items	25,715.28	
Electric conduit	1,680.98	
Baird Court boundary and concourse	9,707.07	
Small Deer House walks and yards	16,898.44	
North end of Baird Court	9,913.74	
Improvements north of Lake Agassiz	6,276.99	
New walks	20,476.09	
Southern boundary fence	5,060.12	
Lion House roof	1,400.00	
Public Comfort Station east of Bronx River	2,033.56	
Bird House	3,943.45	
Sea Lion Pool	2,655.64	
Buffalo Range grading and seeding	2,363.14	
Improvements east of Bronx River	1,481.04	
Excavating Lake Agassiz	2,615.60	
Grading Elk Range and filling pond	2,573.93	
Tortoise Yards	1,461.08	
Beaver Pond pipe line	2,316.73	
Maral Deer Shelter	294.23	
Moving Buffalo House and Corrals	5,918.56	
New shops	1,053.12	
Western Range fences	6,811.30	
Subway entrance plaza	11,749.66	
Restaurant steps	1,294.11	
Landscape architecture	7,788.18	
Boston Road Public Comfort Station	1,403.15	
Feed barn yard and wall	9,114.47	
Camel House yards and fences	1,630.53	
Small Deer House	3,791.50	
Boat House	5,253.12	
Flood gates	1,055.04	
Service road extension	2,760.08	
West Farms block	10,298.44	
Water line to Bear Dens	1,163.33	
Antelope shelter	1,617.44	
Concourse entrance	718.24	
Elephant House walks and yards	9,536.37	
Elephant House	7,586.25	
Subway entrance	535.00	
Elk Yards	3,706.30	
Zebra and Wild Horse installation	1,482.80	
Reconstruction of Crematory	1,067.56	
Shelter, Bronxdale Landing	143.53	304,798.68
Carried forward		$895,131.20

Brought forward		$895,131.20
By the Zoological Society through Park Department:		
Concourse Entrance	$442.16	
Elephant House	7,521.82	
Storage Shed	271.79	
Forestry and Planting	456.60	
Soda Pavilion	1,177.10	
Electric Conduit	174.76	
Improvements west of Baird Court	410.05	
Boston Road Public Comfort Station	237.49	
Landscape architecture	633.17	
Elephant House walks and yards	1,758.62	
Bronxdale Landing	27.75	
Concourse and Baird Court approach	515.50	
Reconstruction of walks	376.29	
Administration Building	1,833.20	
New walks	355.79	
Miscellaneous ground improvements	148.27	
Boston Road and Pelham Avenue boundary fences	684.50	17,024.86
Balance available, December 31, 1908		9,257.28
		$921,413.34

H. R. MITCHELL,
Chief Clerk.

PERCY R. PYNE,
Treasurer.

January 1, 1909.

SHOWING STATUS OF APPROPRIATION NO. 5

Appropriation by the Board of Estimate and Apportionment: Available July, 1908	$65,000.00

NO EXPENDITURES

Balance available for expenditure, December 31, 1908	$65,000.00

H. R. MITCHELL,
Chief Clerk.

PERCY R. PYNE,
Treasurer.

January 1, 1909.

Aquarium Improvement Fund.

RECEIPTS.

Balance available, Report 1907 as corrected	$806.40

EXPENDITURES.

Through Park Department;		
Barney & Chapman, commissions	$164.83	
Lead-lined Pipe Co., valves	150.00	
John Spence, increase on contract for installing lead-lined pipe	50.00	364.83
Balance available for expenditure		441.57
		$806.40

J. J. Odell,
Chief Bookkeeper, Dept. of Parks.

January 1, 1909.

Aquarium Fund.

Received from New York City on account of Aquarium Appropriation for 1908	$45,000.00

EXPENDITURES.

Pay rolls	$29,872.21	
Coal	5,790.67	
Telephone	129.80	
Alterations and repairs	2,512.54	
General supplies	1,200.41	
Fish food	1,683.08	
Live specimens	1,890.39	
Incidental expenses	225.00	
Electric light	126.99	
Ice for feed room	58.16	
Stationery and books	144.29	
Uniforms	26.50	
Furniture	90.00	
Cartage of fishes and cans	364.23	
Cartage of debris	43.00	44,157.27
Balance unexpended		842.73
		$45,000.00

E. R. Sampson,
Disbursing Clerk.

January 1, 1909.

Note—Unexpended balance reserved for the payment of 1908 gas bills.

Stokes Bird Fund.

Endowment Fund	$3,000.00
Accumulated income unexpended January 1, 1908	403.44
RECEIPTS.	
Interest on endowment	165.25
	$3,568.69
EXPENDITURES.	
For protection of bird life	40.00
Balance available for expenditure	519.11
Invested in Illinois Central Ry. Four per cent. Gold Bonds..	3,009.58
	$3,568.69

H. R. MITCHELL,
Chief Clerk.

PERCY R. PYNE,
Treasurer.

January 1, 1909.

NEW YORK, N. Y., March 31, 1909.

To the President and Board of Managers of the New York Zoological Society:

The undersigned, who were appointed the Auditing Committee of the New York Zoological Society for the year ending December 31, 1909, hereby report that they have examined the special audit of the books and accounts of the New York Zoological Society for the year ending December 31, 1908, made by the Audit Company of New York, and find that the report sets forth clearly the expenditures and receipts of the various accounts, and that all the accounts of the Society have been verified, except expenditures shown on Exhibit "E," of the Audit Company's report, covering the ground improvement fund, which expenditures were made through the Park Department, the moneys not passing through the hands of the Society. These expenditures, we understand, are checked by the Comptroller, and are not verified by this audit.

Respectfully submitted,

(Signed.) HUGH D, AUCHINCLOSS,
Chairman.
(Signed.) C. LEDYARD BLAIR,
(Signed.) W. W. NILES,
Auditing Committee.

THE AUDIT COMPANY OF NEW YORK,
43 Cedar Street.

We certify that the foregoing statements showing the condition of the various funds of the New York Zoological Society on December 31, 1908, are true exhibits of the accounts.

The items comprising the expenditures of $590,332.52 and $17,024.86 on Ground Improvement Fund, Number 4, were disbursed by the Park Department. As this money did not pass through the books of the Society, the items have not been verified by us.

THE AUDIT COMPANY OF NEW YORK,

(Signed.) E. F. PERINE, *President,*
(Signed.) F. C. RICHARDSON, *Secretary.*

New York, March 8, 1909.

HARPY EAGLE

REPORT OF THE DIRECTOR
OF THE
ZOOLOGICAL PARK.

IN THE Zoological Park the most noteworthy occurrences of the year 1908 were the completion and opening of the Elephant House, the beginning of the work on the Administration Building, the completion of the Concourse Entrance and Approach, the increase of our living vertebrates by more than 500 individuals, and the systematic campaign against rubbish on the walks.

ATTENDANCE.

Notwithstanding the "hard times" of 1908, and the immense body of men out of employment during practically the whole of the year, the attendance of visitors at the Park increased by 137,698 persons. It is the opinion of some of the officers of the Park that at least a portion of this very large increase was due to "the rubbish war," through which careless and disorderly persons were brought to book, and made either to obey the rules of good order or go elsewhere, while at the same time the Park was made more acceptable to those who love cleanliness and good order in public parks.

The full monthly record of attendance for the year is as follows:

	1907	1908	Increase.
January	39,469	42,356	2,887
February	27,580	37,804	10,224
March	67,258	77,841	10,583
April	90,551	118,384	27,833
May	161,486	182,192	20,706
June	168,034	187,656	19,622
July	187,875	159,797	....
August	190,653	190,813	160
September	126,520	153,007	26,487
October	90,713	120,952	30,239
November	65,179	91,642	26,463
December	60,723	51,297	....
Total for the year	1,276,041	1,413,739	137,698

THE ELEPHANT HOUSE.

In such an institution as the Zoological Park the completion of the largest and finest building of an entire series is necessarily an important event. The elephants, rhinoceroses and hippopotami are so very large, so powerful and so valuable that their proper housing demands the maximum effort in zoological construction. Our new Elephant House is not only our largest and finest animal building, but it also represents our ideas of perfection in such structures. It has not been designed to contain a large number of duplicate pachyderms, but rather to house a collection of the first magnitude, and zoologically as nearly complete as such collections can well be made.

We believe that this building represents high-water mark in zoological building construction. It is spacious, well lighted, beautiful in its lines, both externally and internally, beautifully ornamented without being overdone, and yet wholly free from useless extravagance. The interior lighting and cage "effects" are highly satisfactory, the light upon the animals being quite sufficient, without being too strong and glaring. It is clearly evident that the animals *enjoy* their cages; for were it otherwise, the Indian rhinoceros would not, almost daily, gallop round and round, and with ponderous agility often leap into the air.

In our ever continuous effort to give each of our captive animals an option on several different conditions of light, heat and seclusion, we introduced low down in a side wall of each of the large cages, two large registers for the delivery of currents of warm air. The arrangement has added greatly to the personal comfort of the animals. If the general temperature of the building is a little too low to suit the comfort of an elephant or rhinoceros, the animal at once seeks the currents of warm air issuing from the registers. By means of these warm-air registers it is possible to keep the general temperature of the building at a somewhat lower point than would otherwise be safe.

The construction of the yards and fences surrounding the Elephant House began immediately after the erection of the building had progressed far enough to permit the ground to be cleared of building materials. The work has been vigorously prosecuted at all points, and on January 1, 1909, was so well advanced that its completion is assured well in advance of weather warm enough to make it possibe to use them. This work will be referred to later on in this report.

The only complaint that thus far has reached the Director regarding the use of the Elephant House is of a very novel

nature. The keepers state that on the days when the Park is visited by a large number of visitors many of those who visit the Elephant House remain altogether too long, and can not be induced to go elsewhere. Naturally, the result is serious congestion in the space available to visitors. It is hoped that after about two million persons have seen the Elephant House and its animals, the congestion there will not be quite so serious as it now is on Saturdays and Sundays.

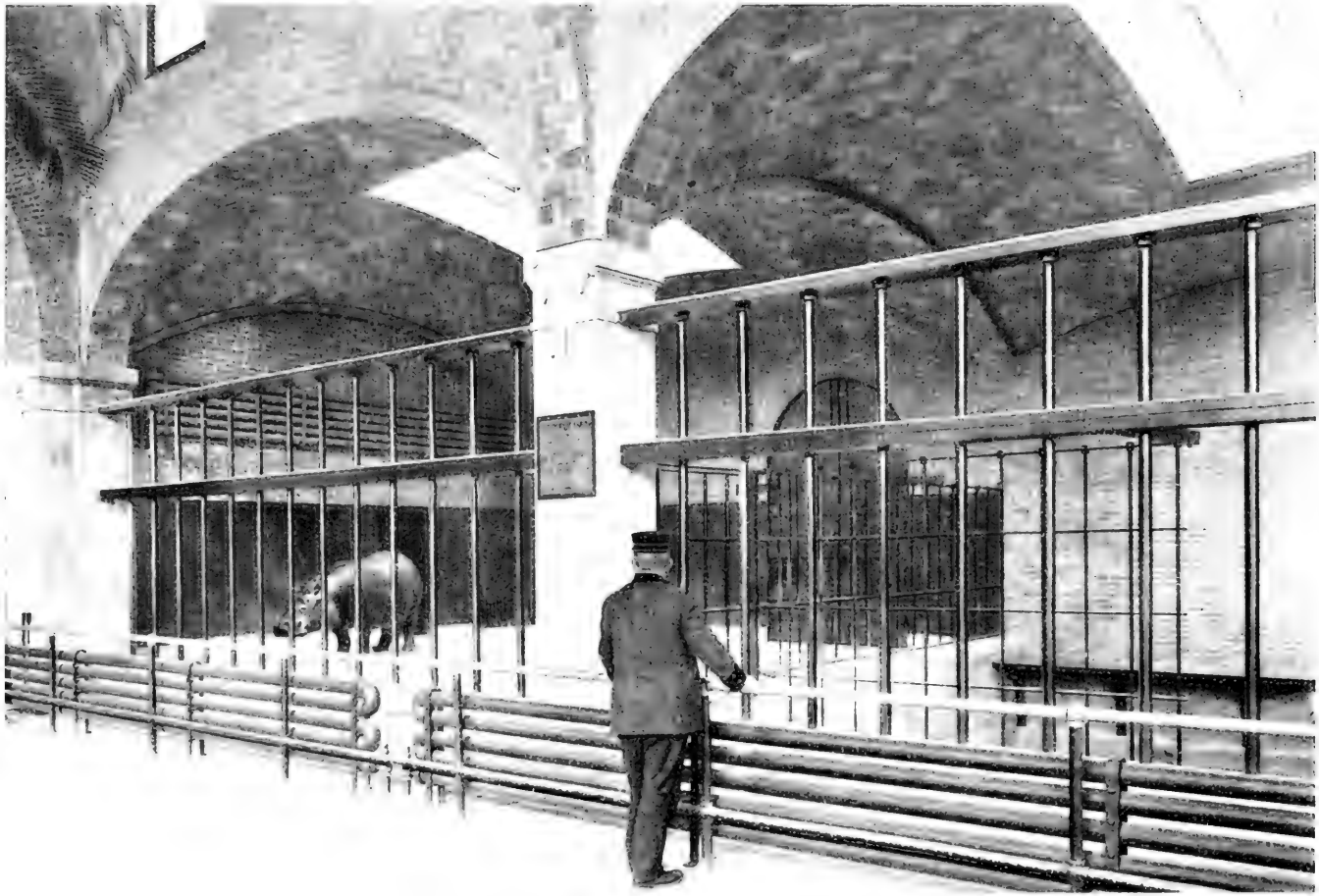
REMOVAL OF ANIMALS TO THE ELEPHANT HOUSE.

The removal of a large collection of very valuable elephants, rhinoceroses and hippopotami over a distance of half a mile is necessarily an undertaking attended with some difficulty. The transfer from the Antelope House of the grand series of animals now filling the Elephant House was accomplished with only one item of serious difficulty. For fully a week the hippopotamus played an interesting game with his keepers, while they endeavored to entrap him in his crate by strategy alone. Finally that effort had to be abandoned as unavailing. A chute of a peculiar design was constructed, and when the time came to put it into operation, "Pete," the hippopotamus, was safely forced into his crate in twelve minutes.

The only real difficulty in the whole transfer of large animals was occasioned by "Luna," or "Alice," the unruly female Indian elephant that once took possession of the Reptile House. True to her newly acquired reputation for obstinacy, and unparalleled contrariness of mind, she strenuously objected to being led away from the Antelope House, and insisted upon breaking back to that structure. Fortunately, however, our newly acquired knowledge of her disposition enabled us to forestall all her efforts to have her own way. When she made her final stand at the Pheasants' Aviary, refusing to take even one more step forward, thirty Park laborers were called to haul on a long rope that previously had been attached to the front feet of "Luna," in anticipation of that event. By means of this rope, and amid general hilarity over the conquering of a mean elephant in that harmless fashion, "Luna" was dragged, yard by yard, all the remaining distance to the door of her stall in the Elephant House, and she then consented to walk up the runway and into her place.

THE CAMPAIGN AGAINST RUBBISH ON WALKS.

One of the most important features of the year's work was our systematic campaign to break up the habit of the lawless and



HIPPOPOTAMUS CAGE IN THE ELEPHANT HOUSE.

disorderly in throwing waste paper, luncheon refuse and paper boxes on our walks and lawns. A full account of this effort and its results will be found in the *Zoological Society Bulletin*, No. 31, for October, 1908.

DEPARTMENT OF MAMMALS.

William T. Hornaday, Curator; Raymond L. Ditmars, Assistant Curator.

The close of 1908 finds the collections of mammals on a basis that, to say the least, is generally satisfactory. The completion and occupancy of the Elephant House on time, at the beginning of winter, was to the curators and keepers concerned a source of profound relief. Had the new building been delayed, the troubles with the "pachyderms" in the Antelope House would have been quite serious.

With the removal of the Elephant House collection, the Antelope House once more came back to its own. The whole interior was promptly painted and put in good condition, and then the scattered antelopes, that had been crowded out of their own special quarters, were quickly brought together by Mr. Ditmars and the force of mammal keepers working under his direction. At last we have the pleasure of seeing the Antelope House chiefly—but not wholly—devoted to the splendid series of African and Asiatic animals for which it was designed. The exceptional occupants are the three species of zebra and the Persian wild ass, all of which must perforce remain where they are, usurping space not belonging to them, until we have erected a Zebra House, as planned. That very necessary building we must have at no distant day.

The Small-Deer House continues to render most excellent service, and it contains a very valuable and interesting collection. The markhors, the Persian ibex and mouflon, which can not survive the winters of New York City in the open air, are regularly quartered in this building every winter.

In the spring of 1908 the Director awoke to a realization of the fact that many gaps had been made by deaths in the collections of smaller mammals, which had not been filled. This was due to the heavy expenditures necessary in the purchase of the very costly rhinoceroses, elephants and other animals required for the Elephant House. There being no funds in the Animal Account, an appeal was made to the Life Members of the Society, practically limited to them because members of the other classes had recently subscribed considerable sums for other special purposes. A call was made for $4,000 in response to which the

following persons generously and promptly subscribed a total of $4,005.

Charles H. Senff	$1,000	Andrew Carnegie	$500
Nelson Robinson	500	Robert S. Brewster	500
Edward S. Harkness	500	G. S. Bowdoin	200
Henry Phipps	100	James B. Ford	100
Zenas Crane	50	George D. Pratt	50
H. C. von Post	50	George B. Hopkins	50
Oliver G. Jennings	50	J. P. Morgan, Jr.	50
David Lydig	50	W. R. Coe	50
William Church Osborn	50	Samuel P. Avery	25
Mrs. Farquhar Ferguson	25	Lloyd Phoenix	25
John J. Pierrepont	25	Mrs. William Nichols	25
Dr. L. Haupt	10	R. P. Lounsbery	10

Samuel Riker, Jr., ... 10.

With this fund the following animals were immediately purchased and added to the collections:

3 Alpine Ibex, breeding adults.
1 Chimpanzee.
1 Malay Tapir.
2 South African Ostriches.
1 Binturong.
1 South American Wild Dog.
2 Wanderoo Monkeys.
1 Black-Footed Ferret.
1 Mexican Red Squirrel.
2 Otters.
4 European Red Foxes.
3 Roe Deer.
3 Canada Porcupines.
1 Polar Bear.
1 Orang-utan.
1 Hamadryas Baboon.
2 Dingoes.
2 Prong-Horned Antelopes.
1 Black Ape.
4 Marmosets.
6 Black and Fox Squirrels.
3 Beavers.
1 Stone Marten.
5 Hedgehogs.
1 European Squirrel.
1 Humboldt Woolly Monkey.
6 Coypu Rats.

A fine adult male Grevy zebra was acquired in exchange from J. N. Ruffin.

Other than the above, the most important animals received by gift during 1908 were the following:

Two Somali lion cubs, captured and presented by Mr. and Mrs. Armar D. Saunderson; One kiang, or Thibetan wild ass, adult male, gift of the Duke of Bedford*; 1 Alaskan black bear, gift of Rex Beach and Fred A Stone; 1 adult male white-tailed deer, gift

*Unfortunately this valuable animal so strongly resented confinement in a shipping crate that on board ship it kicked almost incessantly from the time it was placed on board ship, and as a result it died shortly before the steamer reached New York. Another specimen has been presented to take its place.

of Captain H. Blake; 1 golden baboon, from Mrs. A. K. Dale; 1 dusky Langur monkey, from Captain Hayward, S. S. "Clan Macdonald"; 1 Mexican gray fox, from Maurice O'Connor; a spider monkey from Carlos E. Ostrander; a golden agouti, from H. Melchert; a South American fox, from Captain Siegfried Krause, S. S. "Prinz Eitel Friedrich"; a margay cat, from Mr. Richard J. E. Hulse; a pure albino coyote, from Leslie T. Carter; an ocelot from Alfred Kaegebehn; a margay cat, from Mrs. L. W. Groat; and a white-tailed deer, from Simeon B. Chittenden.

COLLARED PECCARY AND YOUNG.

BIRTHS IN THE ZOOLOGICAL PARK.

The births in the mammal collections were more numerous and important than ever before. The most exciting event of this kind was the birth here, on May 20, 1908, of the first white mountain goat ever bred or born in captivity. Its mother was one of a band of goats born in southeastern British Columbia in May, 1905, and brought here in October of that year. The herd contained three males and two females. All of them matured successfully. The period of gestation proved to be four days less than six months. Two days after birth the kid stood 13½ inches

high at the shoulders and weighed 7¼ pounds. The kid, which is a male, has thriven continuously, and now is a strong, lusty specimen. The mother, however, gave her life to her offspring. After nursing her young most successfully to weaning time, the heavy drain upon her vitality sapped her strength so completely that she died in October.

Another rare and noteworthy birth was that of a Beatrix antelope. The offspring lived and throve for three months, then by accident broke one of its fore legs beyond all possibility of repair, and required to be chloroformed.

IMPORTANT BIRTHS IN 1908.

2 Japanese Red-Faced Monkeys.
1 Campbell's Guenon.
7 Elk: 4♂ 3♀.
3 Axis Deer: 2♂ 1♀.
3 Indian Sambar Deer: ♀.
4 Red Deer: ♀.
2 Barasingha Deer: ♂ ♀.
4 Sitka Deer: 2♂ 2♀.
1 Bactrian Camel: ♀.
1 Tahr: ♂.
1 Rocky Mountain Goat: ♂.
2 Persian Wild Goats: ♀.
2 Indian Antelope: ♀.
1 Peccary: ♂.
5 Fallow Deer: 3♂ 2♀.
3 Elds Deer: ♀.
2 Malay Sambar Deer: ♂.
1 Mule Deer: ♂.
1 Virginia Deer: ♀.
2 Hog Deer: ♂ ♀.
6 American Bison: 5♂ 1♀.
1 Mouflon: ♂.
1 Angora Goat: ♀.
1 Beatrix Antelope: ♂.
1 Tapir: ♀.
1 Common Macaque.
7 Timber Wolves.
1 Rock Wallaby.
3 Six-Banded Armadillos.

GENERAL HEALTH OF THE MAMMALS.

The general health of the mammals is excellent. The death-rate is very low, and the appearance of the animals speaks for their condition. Our most serious troubles with them have been due to their excess of vigor and general pugnacity.

Again the list of deaths of important animals is very small. It includes 1 mountain goat, 1 Baker roan antelope, 1 immature American bison and 1 aged cow, 1 chimpanzee (new purchase), 1 black leopard (by accident), and 2 sea-lions.

The full list of the mammals living in the Park on January 1, 1909, is as follows:

	Species	Specimens.
Primates	32	91
Carnivora	68	146
Pinnipedia	1	2
Insectivora	1	3
Rodentia	35	171
Ungulata	71	251
Marsupialia	7	12
Edentata	2	6
Total	217	682

Gain over January 1, 1908, 29 species; 75 specimens.

DEPARTMENTS OF BIRDS.

C. William Beebe, Curator; Samuel Stacey, First Keeper.

In spite of the fact that no new installations for birds have been provided during 1908, the collections have steadily increased, both in species and specimens. This has been accomplished by a careful concentration of birds in the large flight cages. The present number of specimens in the collection is probably as great as it is possible or wise to reach, with the present accommodations, as any undue crowding is certain to be followed by ill health and constant danger from epidemics. The death-rate has continued to be very low, and in every way the past year may be considered a most satisfactory one for the department of birds.

The two most important accessions to the collection during the year were of South American and of Mexican birds. The former were obtained as the gift of the Curator and Mr. Eugene André, of Trinidad, and were the direct result of a private expedition made by the Curator in March and April to Trinidad, and the delta coast of Venezuela.* The especial thanks of the Society are due to Mr. André for his kindness and interest. As a result of the Curator's trip, over a hundred specimens, including sixteen species new to the collection, were obtained. Among others were such interesting birds as the sun-bitterns, scarlet ibis, kiss-ka-dee, tyrant birds, white-faced tree-ducks,

*See *Z. S. Bulletin* No. 30. pages 442-444.

macavuanna macaw, lesser yellow-headed blackbirds, and saltator and blue tanagers.

The second acquisition of note was a large lot of birds acquired by direct importation from Mexico. The names of tree-partridges, anis, motmot, green kingfishers, golden-fronted woodpeckers, limpkin, phainopeplas, ptilogonys, and yellow-crowned night heron, will show what interesting birds are included in this lot. A number of these, indeed, are species which have never before been kept in captivity, and the study of their habits is yielding facts of great popular and scientific interest.

Among other birds obtained during the year, a number are well worthy of especial mention here. The most important were the one-wattled cassowary, North African ostrich, white rhea, giant whydah, golden oriole, Lawrence warbler, Douglas quail, trumpeter, bell-bird, guira cuckoo, chopi, boat-tail and aztec jay.

While the collection as a whole contains birds representative of every country in the world, yet the splendid avifauna of our own hemisphere is becoming dominant, and rightly so, for of many of these birds but little is known, and both in showy appearance and interesting ways they are of prime importance.

A good-sized flock of turkey and black vultures has been secured, and the experiment of acclimatizing these birds will soon be under way.

Every available moment which could be spared from routine work and supervision of the management of the department, has been devoted by the Curator to scientific work. *Zoologica,* No. 2, is almost ready for the press, and will be entitled,"A Contribution to the Ornithology of the Eastern Coast of Venezuela."

An abstract of the Curator's reasearches in color changes was published in the *American Naturalist* for January, 1908, under the heading of "A Preliminary Report on an Investigation of the Seasonable Changes of Color in Birds."

A forty-thousand-word manuscript has been made ready for the printer, dealing with the general treatment of birds in captivity, and embracing a digest of the knowledge gained during the care of our bird collections during the past ten years. This will appear in the volume soon to be published by the Society on the care of animals in captivity.

A special subscription of $250, from Mrs. Frank K. Sturgis, to be devoted to experimental research, has been of the greatest assistance to Mr. Beebe.

In addition to the investigation of the meaning and cause of color, researches in structural comparative anatomy and embry-

ology are now being undertaken, with the ultimate object of throwing light on the evolution of birds. A large amount of material on these subjects, with illustrations, is being collected for future publication by the Society. Many of the tropical birds in the collection have never been examined in the flesh, and the disposition of dead specimens is being given careful thought. All the more common species are sent to the officers of public schools, where they are skinned and mounted, and are of permanent value in instruction. The rarer specimens are all sent to museums, or are preserved for the researches of the Curator.

The collection of living birds is now the largest in the world in actual number of specimens, and third in number of species. It is the ambition of the Curator to make it one of the first also in the value of its contributions to scientific knowledge.

SUMMARY OF LIVING BIRDS IN THE ZOOLOGICAL PARK ON DECEMBER 31, 1907.

Orders.		Species.	Specimens.
Reiformes,	Rheas	2	2
Struthioniformes,	Ostriches	2	3
Casuariformes,	Emeus and Cassowaries	3	5
Tinamiformes,	Tinamous	1	2
Galliformes,	Quail and Pheasants	60	196
Columbiformes,	Pigeons and Doves	35	182
Ralliformes,	Coots and Gallinules	12	30
Lariformes,	Gulls and Terns	9	33
Charadriformes,	Plovers and Sandpipers	8	14
Gruiformes,	Cranes, Seriema	11	24
Ardeiformes,	Ibises, Storks and Herons	14	36
Palamedeiformes,	Screamers	1	2
Phœnicopteriformes,	Flamingoes	1	1
Anseriformes,	Swans, Geese and Ducks.	41	442
Pelecaniformes,	Cormorants and Pelicans,	9	22
Cathartidiformes,	New World Vultures	5	17
Accipitriformes,	Hawks and Eagles; Old World Vultures	21	36
Strigiformes,	Owls	12	34
Psittaciformes,	Parrots, Macaws and Cockatoos	51	132
Coraciiformes,	Kingfishers and Hornbills	4	5
Trogones,	Trogons	1	1
Coccyges,	Cuckoos	4	12

Orders.		Species.	Specimens.
Scansores,	Toucans	5	14
Piciformes,	Woodpeckers	3	8
Passeriformes,	Thrushes, Sparrows, and all Perching Birds....	248	1,362
52 Orders		563	2,615

DEPARTMENT OF REPTILES.

Raymond L. Ditmars, Curator; Charles E. Snyder, First Keeper.

A notable increase of both species and specimens is shown in the past year's census of the Reptile House. Forty-eight more species were on exhibition at the close of 1908 than on the same date of the preceding year. The greatest increase among species has been with the lizards, a fine series of which has been placed on exhibition in special table cases, showing rare African and Australian species.

Among the important species of serpents added during the year were large examples of the South American bushmaster and the fer-de-lance, both the gift of Mr. Edward Wheelock Runyan, of this city. A valuable series of Mexican snakes was collected by our special agent, Gustav Sabille. From Africa we received a fine example of the rare black python and a series of puff adders showing many color variations. Australia was represented by typical examples of many deadly snakes of that continent—the brown snake, and an innocuous species, the carpet snake, and a small python. Two large king cobras were purchased, and in addition to the large example that has been on exhibition over eight years, they form a striking group of these formidable reptiles.

A novelty among the separate exhibits on the main floor of the building consists of a collection of Indian fishes. These were the gift of Mr. Otto Eggeling, of this city. Among them is a pair of climbing perch, a pair of guramis, and several extremely elongate catfish. The climbing perch are particularly interesting, as they can leave the water and crawl about on land by means of their peculiarly constructed ventral fins. This species is provided with water sacs connected with the gills, keeping those organs moist for some time while their owner is out of the water. The gurami is also an interesting fish, as it has a habit of building its nest of bubbles. It often breeds in captivity.

Owing to the addition of a number of species of snakes and lizards, it was often necessary to place several kinds together. Hence the system of labeling in the Reptile House is being rapidly changed. Hereafter picture labels will take the place of the plain ones, in order that the visitor may immediately identify the various exhibits. From the time of the opening of the Park nine years ago, the public has continually evinced a keen interest in the exhibit of the Reptile House, and the attendants are called upon to answer a great number of queries. It has steadily been the custom to answer on the labels the questions most frequently repeated, and the descriptive matter in the building is very complete.

The alligators incubated and hatched in the Reptile House nine years ago have continued their rapid growth. Observations of these specimens have been of much value. While of considerable importance, the rate of growth of the American alligator does not seem to have received much attention except under conditions so far removed from the normal as to be of little value. Our studies demonstrate that alligator farming is quite practical. The eggs are easily incubated, and the young grow fast enough to be marketable for their hides within a period of five years. It was previously imagined that it would take anywhere from eighteen to twenty-five years for a specimen to grow large enough to possess a marketable hide.

With the exception of one alligator over twelve feet long, and several large crocodiles, the alligator colony passed the summer in the rock pool outside of the building. All the crocodilians grew substantially. In the pools of the Reptile House they form an imposing display. The specimens hatched and reared in the Park are now about eight feet long, indicating a growth of about one foot per year.

After an eccentric career in captivity, extending over eighteen months, our largest regal python, captured on the Malay Peninsula, has commenced feeding of her own accord. Her first voluntary meal in the Park consisted of a pig weighing about thirty-five pounds, which was offered when freshly killed. For fourteen months this snake was fed, at intervals of about ten days apart, with two fresh-killed Belgian hares, sewed together with heavy twine, then pushed ten feet down her throat with a bamboo pole while the snake was held by twelve keepers. Between times she was offered everything known on the *menu* of a python, but stubbornly refused food. Although a great relief to the members of the Reptile House staff, the news of this big snake

feeding voluntarily may possibly be a disappointment to our visitors, owing to the novel spectacle on the days the python was forcibly fed.

Two additional specimens of the regal python, each about twenty feet long, were purchased during the past year.

CENSUS OF REPTILES, DECEMBER 31, 1908.

Chelonia	44	352
Crocodilia	3	62
Lacertilia	39	241
Ophidia	77	340
Batrachia	19	287
Total	182	1,282

The total census of the Zoological Park collections on December 31, 1908, is as follows:

SUMMARY OF COLLECTIONS.

	Species.	Specimens.
Mammals	217	682
Birds	563	2,615
Reptiles	182	1,282
Total	962	4,579
Increase over .1907	97	545

CONTRACT WORK IN GROUND IMPROVEMENTS.

Conducted under the Direction of the Park Department for the Borough of The Bronx. Martin Schenck, Chief Engineer.
W. P. Hennessy, Assistant Engineer.

The Elephant House.—Work on the Elephant House was diligently prosecuted by the contractors, Messrs. F. T. Nesbit & Company, and on November 15 the building was turned over to the Society for occupancy. The structure is as nearly perfect as it was possible to make it. Externally it is very handsome, its interior is highly successful in every way; it is well lighted, easily heated and ventilated, and affords a spacious and comfortable home for the animals that it contains. The work of the contractors has been very satisfactory, and the perfection of the

finished work is largely due to the high character of the contractors' superintendent, Mr. John C. Coffey. Mr. Coffey is now rendering similar service on the Administration Building.

The total cost of this building is $165,546.25, and it is a very fine structure to have been obtained with that amount of money. It was occupied by its animals and opened to the public on November 19, 1908.

The Elephant House Yards.—No modern elephant house is in any sense complete without a series of yards enclosed by heavy steel fences, in which the animals may enjoy exercise in the open air and sunlight. With the exception of the serpents and a few small monkeys, it has been the rule of the Zoological Society that each animal in the Park should have a comfortable yard connecting with its in-door quarters. To provide playgrounds for adult elephants and rhinoceroses is a very serious task, and involves heavy expenditures.

In addition to the heavy interior fences designed to keep the animals from the visitors, another strong steel fence, six feet outside it, is necessary to keep the visitors from the animals. It is necessary also that a complete series of gates should be provided in order that wagons may drive through the yards, completely around the building.

The yards for elephants and rhinoceroses must be heavily paved with stone, or concrete, in order that they may easily be cleaned, and also in order that those heavy and powerful animals may not be able to dig up the surfaces of their enclosures. In view of the many difficulties involved in saving the valuable trees in the enclosures surrounding the Elephant House, it was imperatively necessary that all work on the surfaces of the yards should be performed by laborers and foremen under our own immediate supervision.

Steel Fences for Elephant Yards.—During October, 1908, a contract for furnishing and erecting all fences and gates for the yards surrounding the Elephant House was let to McHarg-Barton Company at $13,700. Work began promptly, was prosecuted vigorously, and completed within the contract time. The fences themselves, and the gates are of good materials and have been excellently made. As stated elsewhere, much trouble was experienced with the sub-contractor on the concrete work and the setting of the posts. The setting of the posts in the changeable and inclement weather of December and January made a great deal of trouble for all concerned, but the hurry was necessary and unavoidable.

This contract was completed in March, 1909, and will thus enable the animals of the Elephant House to occupy their yards immediately upon the arrival of the warm weather.

The Concourse Entrance, Concourse and Western Approach to Baird Court.—This important contract (which did not include the curbing and sidewalks of the Concourse and Approach) was let in October, 1906, to the John V. Schaefer, Jr., Company, at a cost of $58,379.50. It was completed in the summer of 1908.

Walks and Curbing of Concourse and Approach.—For this work a contract was let in September, 1908, to John B. Malatesta, for the sum of $13,699.00. The work was satisfactorily completed in November, 1908.

New Soda Pavilion.—This structure was satisfactorily completed in May, 1908, by Kelly & Kelly, at a total cost of $8,959.60, and immediately thereafter began to serve all its purposes.

Public Comfort Station.—This unfortunate structure was begun by J. J. Buckley in January, 1907, and finally was completed by S. A. Whisten in February, 1909. This is the contract that was begun prematurely by the first contractor, and had to be relet under very adverse conditions. The total cost of the building is $24,652.39. It is to be opened to the public in the spring of 1909.

DEPARTMENT OF MAINTENANCE AND REPAIRS AND OF GROUND IMPROVEMENTS.

Herman W. Merkel, Chief Constructor and Forester; E. H. Costain, Assistant Forester and Captain-of-the-Watch.

Forestry and Planting.—Owing to the large extent of plantings to be cared for, and the great number of buildings that regularly contain tropical plants, the amount of maintenance work necessary in this department is annually increasing.

During the winter some very necessary tree pruning and surgery was performed in the enclosed portion of the Park. It is gratifying to know that the number of trees that are annually dying has been now reduced to a very small figure, with the exception, of course, of the chestnuts. It is to be noted here that one of our experiments, carried on for the control of the bark disease of the chestnut, points to success, although it is yet too early to make a definite statement. The number of trees pruned or otherwise treated in 1908 was 305. Of the minor planting operations carried out during 1908, were the planting out of 150 permanent shade trees, the transplanting of 106 evergreens

from places in the border plantation, where they had become too dense; the temporary planting between the Boston Road and the Public Comfort Station, and the flanking of the west approach to Baird Court with large specimens of rhododendrons. No trees or shrubs were purchased during the year, no money being available; and all the planting was with stock taken from our own plantation or nursery.

Insect Pests.—Of insect pests, the elm-leaf beetle, which this year occurred in larger numbers than in the previous four years, was of the greatest importance. The tussock moth, also, seems to be on the increase, and since it is a dangerous matter to employ in a zoological park such stomach poisons as arsenate of lead, with which these pests could readily and cheaply be controlled, it may cause us a great deal of trouble. Several bad cases of the cottony maple-scale, and similar sucking insects, were quickly brought under control. The annual occurrence of the tent caterpillar has become less and less serious, because of the continued warfare waged against this most unsightly of all our pests. In connection with this insect, the following figures may be of interest: In 1905, 40,300 nests were destroyed; in 1906, the number was 11,194; in 1907, only 4,541 nests were found; and in 1908, the total was reduced to 3,712 nests.

The maintenance cost of forestry and gardening, which in 1908 was entirely inadequate to the work that needed to be done, will have to be recognized more fully hereafter, especially in such places as Baird Court, the Italian Garden and the Concourse.

The Italian Garden.—The Italian Garden has proved to be a very popular feature. The central beds were first planted with 8,000 yellow prince tulips, and afterward with 1,600 scarlet sage of a new and dwarf variety called "Zurich." After the sage was cut down by frost, the center beds were filled with 10,000 yellow pansies, which will make a fine showing next spring.

The Care of Lawns is now an important item. The amount of work in that line has been steadily increasing, and is unavoidably costly, because on account of the much broken surface and numerous small patches, the grass lawns have to be mowed chiefly by hand labor.

Plants in Buildings.—The decorating of the large animal buildings with palms and other foliage plants, and the care of these decorations under very adverse conditions, was successfully performed by the force of gardeners and hothouse men. The Society now owns 100 large palms and other decorative plants, ranging in height from eight to thirty feet, and also a great

many smaller plants, including sago palms and ferns. Last year the collection received several notable additions, among which were two large Illawarra palms, presented by Mrs. S. F. Colgate, and a fine specimen of fan palm, given by the estate of William F. Zeigler, through Mr. W. S. Champ. With the aid of our greeenhouse at the nursery, and our new cold-storage shed for bay-trees, we have been able to keep the decorations of tropical plants up to the standard set in the beginning; and we believe they are one of the attractive features of the Park. It is hoped that in the near future the greenhouse plant at the Nursery can be supplemented by the addition of another greenhouse.

General Maintenance.—The general maintenance, such as the distribution of food and supplies, the cutting and distribution of ice, the disposal of manure and garbage, and the collecting of refuse generally, was successfully carried on by the maintenance force, although on several occasions the amount of work demanded was very embarrassing.

Policing.—The maintenance of order in the large Saturday and Sunday crowds, and the general policing of the Park, was largely done under the direct supervision of Mr. Merkel, who, at critical periods, gave this work his personal supervision. The number of persons arrested by members of the Park force was sixteen, and all of them were convicted. The shooting of birds, the building of fires in the woods east of the Boston Road, and peddling, were successfully broken up. The part taken by our maintenance force in "the rubbish war" was very important, and that campaign has been fully described elsewhere.

Repair Work.—In the older buildings of the Park, repairs to roofs, gutters, walls, cage-work, and heating apparatus were made wherever necessary.

In the Reptile House, the entire turtle crawls, which formerly were of wood and zinc, were rebuilt in the most substantial manner of concrete, stained green with oxide of chromium (the only known green pigment which will not change color). The wreck caused by the female elephant was promptly removed, and the railings, cages, etc., repaired. The slate roof and copper gutters were carefully gone over, and this building is now in good condition. The amount spent during the year on this structure was $650.

At the Antelope House the copper roof was carefully gone over, and the construction of the skylights was somewhat changed more perfectly to keep out rain and snow. Some minor repairs were necessary to the heating apparatus and to the plas-

tering around the elephant cages. In November the removal of the largest animals to the Elephant House enabled us to give the whole interior of the building a thorough cleaning and painting. The cost of work in the Antelope House for the year was about $650.

At the Bird House, besides many minor repairs, the entire parrot hall and its cages were overhauled, and new and heavier wire netting put on the cage fronts. A brick wall was built in the cellar, to shut off coal gas from the Curator's office, at the same time making a room that was afterward put into use as a storage room for heads and horns. The roof and gutters have needed almost constant attention. Several partitions of plate glass were put into outside cages, and a great deal of repair work was done around these cages. The entire building was painted inside and outside, the total cost for the year being about $825.

At the Primate House a great deal of woodwork was removed from the vicinity of the large cages, and a number of panels below the fronts of the cages were taken out and replaced with glass panels. The ceiling lights, which were in danger of falling, were fastened up with wire. The heating plant was entirely overhauled, one new boiler being erected, and necessary repairs were made on the other boiler. A great amount of repair work was necessary on the cage fronts. The cost of the labor and materials expended in this building was $875.

At the Lion House the heating plant required extensive repairs, one entire boiler being removed and replaced with a new one. All of the iron work of the inside cages was painted, and also part of that of the outside cages. The roof and gutters also received some attention. The ceiling lights, which were found to be in a highly dangerous condition, were made safe. This building will require further repairs next year, especially in repointing brick and terra cotta work. The cost of the work was about $500.

At the Mammal House it was found necessary to replace parts of many of the inside cages; and the whole interior and exterior of this building was cleaned and painted. Two new sections were placed in the boiler of this building, and the drains were overhauled and cleaned several times. The total cost of the work in this house was almost $1,300.

Repairs and additions to other buildings, and the cost thereof, were as follows: At the Aquatic Bird House the new net, the general repairs, and the inside and outside painting, cost about $200; the Pheasants' Aviary was painted at a cost of $375; installing

electric lights and making repairs in the Feed Barn, cost $200; and repairing the cage fronts and valves in the Small-Deer House cost $100. All the Entrances were painted, and eight exit turnstiles strengthened with iron rods, at a cost of $450. The building of crates, and other work done for the Mammal and Bird Departments, amounted to $475, help being given these departments when large animals were shipped, and when keepers were away.

Heating.—The various heating plants are in a rather unsatisfactory condition. The watchmen-firemen are looking after thirty-six fires at night, some of which are taken care of by keepers during the day. Owing to the unfortunate fact that the Park contains boilers of nine different patterns, it is almost impossible to keep on hand a complete set of repair supplies, which may become necessary at any time during the day or night.

Outside Installations.—All the fences around the Antelope Yards were painted, at a cost of $350; the Flying Cage was repaired and painted, which cost $640; and nearly $1,500 was spent in painting, putting in new wooden floors, repairing drains and cement floors, and putting new partitions in the Bear Dens. The many fences surrounding the Asiatic Deer Barn were repaired and painted at a cost of $175. In the northern Fallow Deer Range the shelter house was repaired and set upon a concrete foundation, a new shed was built, and the fences repaired, at a total cost of $265. On Mountain Sheep Hill the cost of repairing the fences, setting new fence posts, and building a small shed was $275. The Wolf and Fox Dens were painted at a cost of $165. The boundary fence from West Farms to Bronxdale was repaired and painted at a cost of $140, and putting up tree guards and repairing the fence in the Elk Range cost $130. About $100 was spent in painting the Beaver Pond Fence, and taking stumps and old logs out of the pond. A number of small sheds were built and put up in the various ranges, and $1,200 was spent for supplies, paint and labor for the Boat-House, Soda Stands and Restaurant.

GROUND IMPROVEMENT WORK.

Early in the year a shed, seventeen by forty feet, was built in the Service Yard, for the Privilege Department, a part of the boundary wall being used as one side of the house. This was erected on a concrete foundation, with a concrete floor. Part of the machinery and plumbing was installed by our force.

Crematory.—A crematory was erected near the Nursery, after designs made by Mr. Merkel. This consists chiefly of a heavy double steel cylinder, four by eight feet in internal diameter, with a double grate and brick ash-pit. The steel shell, as well as the upper grate, is water cooled, and connected with a 150-gallon expansion tank. A heavy cast-iron cover, raised and lowered with a differential block, closes the top of the cylinder. This crematory is something which we long have needed, and which gives us adequate means of disposing of offensive refuse in a cheap and sanitary way. The ashes are saved and stored, and supply us with a valuable fertilizer that is free from weed seeds and other objectionable matter. This crematory has proven an entire success, and it only remains for us to protect it from the weather by proper housing. The crematory has been so placed that refuse can be dumped directly into the furnace from carts or cans.

The Concourse.—At the Concourse all the necessary grading was done, and a large quantity of top-soil was obtained and placed. In accordance with our planting plans a great deal of rock was removed from the hill west of the Approach, and everything was made ready for extensive planting operations in the spring of 1909, in accordance with the plans of Chief Forester Merkel. A service road, and walk leading from the Entrance to the Duck Aviary, were built. The surface of the Concourse roadway, which had been left in a rather unsatisfactory condition, was top-dressed and rolled. Part of the road leading from the Concourse to Bronxdale, and a service road for the use of the contractor in erecting the new Aministration Building, were constructed.

West of Baird Court.—The walks leading from the West Approach to Baird Court to the Aquatic Bird House, and from the West Approach toward the Flying Cage, as well as a connection with the Service Road, were constructed, and the old road was torn up, covered with top-soil and seeded. A concrete retaining wall was built west of the new Soda Pavilion, at the Aquatic Bird House.

Walks.—Several important walks, notably those in the vicinity of the Restaurant, and those leading from the Crotona Entrance, past the Camel, Llama and Elk Ranges, were surfaced with our tar macadam, and are now, for the first time, in a perfectly satisfactory condition.

The main walks leading to the Elephant House, as well as those surrounding the yards, were built and made ready for tar-

ring in the spring. Four walks, leading from the Boston Road, and from the Plaza just inside of the West Farms Entrance to the new Public Comfort Station, were built, and two lines of fence were erected.

Elephant House Yards.—The entire surface of the Elephant Yards was graded; and an eight-inch sewer and eight manholes were built for properly carrying off surface water and refuse from these yards. In connection with these yards some very difficult and expensive grading, by means of concrete platforms built on piers, was found necessary, in order to preserve the lives of several fine trees growing there. Several portions of the foundations for iron fences, which come below the depth called for in the contract for their erection, or which were particularly difficult to treat on account of tree roots, were put down by our force. The Telford paving for most of the yards was put in place, and only a little of this, and the surfacing, remains to be done in 1909. In the interior of the Elephant House some important ironwork, for the protection of the hot-water pipes from the elephants, and a lot of wire-work for the cage fronts, was erected by our force.

Breeding House.—The portable breeding house for birds, with its outside cages, was moved, practically rebuilt, and put upon a foundation of concrete.

The Otter Pools were cleaned out and a new concrete platform built in one of them. The old "Soda Pavilion No. 4" was moved to the site of the launch-landing in Bronxdale, and there put upon a concrete foundation. At that point a small dock was built in front of the shelter pavilion. The foregoing completes the list of important operations by our Ground Improvement force for the year 1908. Besides directing this work, the Chief Forester also spent a great deal of time in watching the construction work of the several contractors at work in the Park.

DEPARTMENT OF ADMINISTRATION AND PRIVILEGES.

H. R. Mitchell, Chief Clerk and Manager; William Mitchell, Assistant.

During 1908 the clerical work in the Department of Administration and Privileges sensibly increased in volume over previous years. Early in the year, a change was ordered in the methods of purchasing and paying for supplies required in ground improvement work, which added considerably to our office work. It was not, however, found necessary to make an increase in the office force. Instead of supplies of this character

being bought and paid for by the Society, as formerly, they now are purchased on orders issued by the Park Commissioner, and the bills therefore are forwarded to the Comptroller's office for payment.

Privileges.—In all lines of business the year 1908 showed a more or less extensive falling off, due to the panic of the previous fall, and the subsequent financial depression which continued throughout 1908. Early in the season this depressed condition was brought to the attention of all members of the privilege force, and their personal interest was enlisted in a special effort to bring the results for the season up to those of the previous year. The manner in which our employees responded was, indeed, gratifying, as the figures for the year will show. While the business fell off in some directions, it increased in others, so that when the profits for the year were made up, there was an actual gain of several hundred dollars.

A large reduction was made in the amount put into new equipment and betterment of plant, over that expended for this purpose in the previous year; and finally, the actual cash remitted to the credit of the Animal Fund reached $21,341.43.

A few interesting calculations have been made to show the development of the Privileges during the past five years, as compared with the increase in attendance during the same period. They are as follows:

INCREASES DURING THE PAST FIVE YEARS.
(1904 TO 1908, INCLUSIVE.)

Attendance	23 per cent.
Gate Receipts	51 per cent.
Net Earnings from Park Privileges.	96 per cent.
Profits of Privilege Department, generally	153 per cent.
Profits from Soda Water, specially..	271 per cent.

Soda Water.—To our former equipment of fountains was added during the season of 1908, the fountain installed in the new soda pavilion. This is a combination of wall and counter fountain utilizing the double wall fountain which was purchased in Brooklyn about two years ago and has been stored, together with the Becker twelve-foot counter apparatus previously used in the temporary stand near the riding animals.

Owing to the hard times, the gross receipts of this privilege did not increase greatly during the season. The net profits, how-

ever, responded well to the continued economies in maintenance and manufacture. As noted elsewhere, the soda-water business has gained 271 per cent. in net profits during the past five years, or from 1904 to 1908, inclusive.

New Soda Pavilion.—The new soda pavilion near the Aquatic Bird House, was completed early in May, 1908. Our original plan for this building provided for large doors on all sides, giving it an almost unlimited capacity with perfectly free access from all quarters; but this arrangement was so changed, and the size of the building so much reduced, that it was out of the question to carry out our plan for placing the fountain in the center of the building. The first busy day after the fountain was opened demonstrated that it was out of the question to handle the crowd without opening the building on the eastern side. A folding door, twelve feet wide, was opened on the east side of the building, and a spacious platform constructed under the shade of a large tree, thus permitting patrons to sit down outside the building. This fountain is located somewhat off the main thoroughfare, and has not as yet done anything like the business of the old location near the riding animal stand.

Ice Cream Plant.—Early in 1908 it was decided to put up a new temporary building suitable in form and location, so as to be available eventually as a storage shed, but which could first be utilized as an ice cream factory. This building is eighteen by forty feet, with concrete floor, and is divided into two rooms.

A great saving in labor has been effected by having the new plant on the ground level, instead of in a difficult basement. This change made a very satisfactory showing in the profit and loss account for the season.

Boating.—During the two years the boating privilege has been operated by the Society, it has more than doubled the net profit received from the lessee during the entire five years it was operated by him. During the season the boating equipment was increased by the addition of another carload of Mullin's steel rowboats, as well as by twenty-five new flat-bottomed wood boats. The entire equipment, including the electric launch, was overhauled, repainted and put in order before the season opened. A number of the old wooden boats, purchased from the former lessee two years ago, were found not to be worth further repairs and were destroyed. We expect, as rapidly as possible, to replace this old equipment with the best and safest boats that can be obtained.

On busy days the business for the launch could not be han-

dled by the "Albatross" alone, and to relieve it somewhat a large eighteen-foot rowboat was fitted up with awnings and cushions. This boat was rowed to and fro on the lake, on regular trips. It proved quite popular, and carried a number of passengers sufficient to demonstrate the necessity of another electric launch. As a result, an order has been placed for another thirty-foot electric launch built on practically the same lines as the "Albatross." This boat will be ready for delivery by the opening of the season of 1909.

By the use of two launches scheduled so that one will be at the dock loading while the other is out on the trip, it is expected that from fifty to seventy-five per cent. more passengers can be carried. That portion of the river used for boating is badly in need of a little work in the way of dredging, and removing old stumps and logs.

Rocking-Stone Restaurant.—The business of the Rocking-Stone Restaurant showed an increase in keeping with the increase in attendance for the year. There was not, however, such a good showing in net profits, for the reason that quite a sum was expended in advertising, and for the music furnished daily throughout the entire season, from May 1st to October 1st.

Guide Books.—The Elephant Edition of the Guide Book sold freely throughout the year, and heavy inroads were made in the stock on hand. It is estimated, however, that the present edition will very nearly run through 1909. The net profit from this source for the year was fully up to our expectations.

Souvenir Books and Postal Cards.—A new and revised edition of each series of the Souvenir Books were issued during 1907. The half-dollar series is now completely exhausted, and the issue of a new edition is under consideration.

Strange to say, the sale of souvenir postal cards seems to have been affected by the general depression, more than any other privilege. The usual assortment of sets were kept continually on sale and special efforts were made to bring the sales up to the previous years, but without entire success. A new series of colored cards, consisting of thirty-two subjects, was issued just at the close of the season. These cards are from three-color process plates by the American Colortype Company, and in artistic effect they are very satisfactory. They are a great improvement over our previous colored card, printed abroad.

Riding Animals.—The Riding Animal receipts for the year were satisfactory except the fact that we were again without the use of a riding elephant. The profits of this privilege were about

MAIN HALL OF THE ELEPHANT HOUSE.

the same as the previous year, notwithstanding the fact that the cost of operation was somewhat increased owing to the removal of the soda stand at this location, and the consequent necessity of maintaining a separate cashier for the riding animal business.

Toward the close of the season the female elephant "Luna" was purchased from the Luna Park Company at Coney Island, with the intention of using her as a riding animal, but we discovered that she is so nervous and obstinate it was not considered wise to make any attempt to utilize her as a riding elephant. She will be used for exhibition only.

Gate Receipts.—As the Park attendance increases on free days, a proportionate gain has been made in the receipts from admissions on pay days. The year 1908 was no exception in this particular. Many visitors seemed to find it desirable to come to the Park on pay days, in order to see the collections without the annoyance of encountering the crowds present on other days.

DEPARTMENT OF CIVIL ENGINEERING.

George M. Beerbower, Civil Engineer.

Our Engineer's most important work during 1908 was the constant and at times continuous inspection and superintendence of the erection of the steel fences and gates of the ten large yards surrounding the Elephant House. The plans and specifications for this work were made by Mr. Beerbower in 1907, and on them a contract was let to the McHarg-Barton Construction Company at $13,700. The contract provided for the erection of the fences and all copings underneath them, as well as for their manufacture. To resist the attacks of adult elephants the gates and fences required to be built to withstand blows or pressure of at least 5,000 pounds delivered at their weakest point. This, of course, calls for very strong steel posts, set deeply in solid concrete, and connected by horizontal rails of steel so heavy that no elephant can bend them. To run such heavy fences over very uneven ground, and secure a result that is sufficiently strong and at the same time not positively offensive to the eye, is a very difficult task.

The work of setting the posts, and constructing the concrete copings, proved to be very vexatious. By the McHarg-Barton Company all this work was let to a sub-contractor. In order to secure honest and correct work from dishonest and tricky laborers who sought by every possible means to make improper, worthless work pass as "good," Mr. Beerbower was obliged to watch

the construction of every foot of the concrete foundation work. In this he had at the last some assistance from the contractor's engineer, but no assistance of any value from the city inspector placed on the work by the Park Department.

This sub-contract for the concrete work was in several ways a valuable object lesson. It showed how the taxpayers of this city are liable to be robbed whenever a sub-contract falls into the hands of an ignorant or careless man, who is served by laborers that are utterly devoid of all sense of workman's honor, and who strive early and late to "skin the job."

It is no exaggeration to say that, with the best intentions on the part of McHarg-Barton Company, and with excellent ironwork generally, it was only the constant, hourly presence of Mr. Beerbower on the work, practically with club in hand, that prevented the laborers on the concrete work and the setting of all posts, from turning in work looking fair on the outside, but utterly defective within. Matters finally reached such a pass that the McHarg-Barton Company furnished the services of an engineer to assist Mr. Beerbower in maintaining on both sides of the Elephant House the close surveillance that was necessary.

DEPARTMENT OF PHOTOGRAPHY AND PUBLICATIONS.

Elwin R. Sanborn, Photographer and Asst. Editor.

The publications issued in 1908 consisted of four regular numbers of the BULLETIN, the Annual Report and Part II of the annual brochure of the National Collection of Heads and Horns.

In photography 533 negatives were taken, and 4,071 prints were made. The index albums were brought up to a more perfect state for ready reference, and the number of volumes was increased to twenty-three. A catalogue of the halftone plates belonging to the Society was completed and brought down to date. A proof of each plate has been mounted in a serviceable scrapbook, with full data regarding its history. The Society is now in possession of 1,311 halftone plates, chiefly of animal subjects.

Mr. Sanborn has devised a plant for the production of transparencies and enlargements, which is operated in one of the storerooms. Satisfactory results are obtained by using the north light, which is reflected into the room by a large metal screen.

The difficult problem of photographing live monkeys and baboons received the serious attention of our photographer, who designed a cage especially for his purposes, with which he has already secured some excellent results.

REPORT OF THE DIRECTOR OF THE AQUARIUM TO THE BOARD OF MANAGERS.

THE New York Aquarium as a place of recreation for the people, has more than fulfilled the expectations of the City that founded it. In twelve years it has been visited by nearly twenty-two millions of persons. Its yearly attendance, never less than one and a half millions, has steadily increased until the present time, the number of visitors for 1908 being 2,536,147 —an average of almost seven thousand a day.

Under the management of the New York Zoological Society, which has for six years been engaged in improving its equipment and exhibits, its yearly attendance has increased by a full million of visitors.

The plans of the Society for the betterment of the institution are being steadily carried into effect, and it is now on an excellent basis for the wellbeing of its aquatic life and the satisfaction of the people who visit it.

The City has recently granted a new improvement fund of $5,000 to be used chiefly for a new roof and enlarged skylights. The latter improvement will nearly double the amount of light in the building and will contribute not only to the comfort of visitors, but to the health of animals kept in the large floor pools.

The work completed during the past year has given the Aquarium a splendid sea-water system, which makes possible the keeping of many marine forms, hitherto not exhibited here. An underground reservoir of 100,000 gallons capacity was filled with ocean water early in July, since which time marine species have been kept in healthful condition. Still more attractive features of sea life will be added next spring, when our collections will be more varied in character than has been possible with the old water system. The sea-water reservoir is demonstrating its value in other ways: Since it was put into operation in July there has been a notable saving of animal life, the loss of specimens due to foul water having been largely eliminated. Losses of specimens at present are due chiefly to fighting among the occupants of the tanks for which there is no remedy.

The saving in coal was also important, amounting from October 1 to December 31 to 147 tons as compared with the same months of previous years. There is a vast difference between

heating water from the warm underground reservoir, and that pumped directly from the harbor in the winter months. The reservoir will eventually pay for itself.

The difficulties encountered in the heating of sea water, by means of iron and bronze heaters which corrode and break down, have apparently been solved by the employment of a heavy coiled heater made of chemical lead. It has already lasted much longer than others previously tried and appears to be in perfect condition. No other aquarium has the problems to contend with that have developed here, where sea water is heated in winter for tropical species, and fresh water refrigerated in summer for northern species. With warm and cold tanks of both fresh and salt water, it has four distinct water systems regularly in use.

The Aquarium is not only ready to do anything that is possible in public aquariums elsewhere, but probably something more, and with the return of another summer collecting season, interesting forms of sea life will occupy many of the tanks as permanent exhibits. About 200 species of fishes are usually kept in our 94 glass-fronted tanks, and number from 3,000 to 4,000 specimens of native marine- and fresh-water species and tropical species from the Bermuda Islands. These figures do not include the product of the fish-hatchery. The collection of invertebrates is as yet limited to local marine forms, but will later include tropical species of showy colors. The large floor pools contain seals, sea-lions, alligators, crocodiles, large sea-turtles and sturgeons. The table aquaria usually contain about twenty species of fresh-water turtles.

During September the large central pool contained two porpoises and a leatherback sea-turtle, the latter weighing 840 pounds. Unfortunately some of the lung-breathing marine animals are not adapted to a long life indoors, and it is perhaps unwise to repeat experiments with such as are affected by warm air when the building has to be heated.

Exchanges of fishes were made during the year with the Detroit Aquarium, the Sportsmen's Show in Boston and with the Tuxedo Club.

Tropical fishes were brought from Bermuda, and local sea fishes were procured by sending tanks to the fishing banks on the steamer "Angler." Nearly all other specimens obtained during the year were gathered by the collector, Mr. John DeNyse, or by seining parties sent out from the Aquarium to various parts of the lower bay and to park lakes of New York and Brooklyn.

MINOR IMPROVEMENTS.

Among the improvements made from the Maintenance Fund may be mentioned the extension of the gas-light system to all tanks on the balcony; the introduction of a steam-heating coil of heavy chemical lead for warming sea water; the galvanizing of all iron gratings on the service gallery to prevent iron rust; the introduction of wicker (rattan) strainers instead of wire to prevent iron rust; the placing of covers over radiators to throw heat outward and protect painted pillars, and the filling of the reservoir with sea water, brought by tank steamer from Sandy Hook Lightship.

The Aquarium, notwithstanding the improvements affected during the past six years, is handicapped by its limited space. There is no room for the increase of its collections and it is now difficult to find room for the location of so much as a pump, a filter or coal bunker. In the pump room the men have barely space to move about and the coal-stowage capacity is limited to a six-days' supply, which endangers the entire marine collection during heavy snow storms when the delivery of coal is uncertain.

Growth of Young Sea-Turtles.—Director A. G. Mayer, of the Marine Biological Laboratory at the Dry Tortugas, Florida, presented in July numerous young loggerhead turtles newly hatched, which in the pure sea water now available at the Aquarium have grown and thrived in capacity. Hitherto all attempts to raise young sea-turtles at the Aquarium have proved unsuccessful. The requirements for success seem to be pure sea water at a temperature of about 75 degrees Fahr. and a sunny situation. The food used was chopped clam and fish. In these specimens the average length of carapace was 2¼ inches and the weight 1½ ounces. Six months later the average length of carapace was 4½ inches and the weight 9½ ounces.

Large Lobsters.—Two lobsters (*Homarus americanus*) of unusually large size were received at the Aquarium during the year. The first, received on January 23 from Cranberry Isles, Maine, weighed 14½ pounds, its length from tip of antennæ to tip of tail being 34 inches. The second specimen, received April 29 from off Atlantic Highlands, N. J., weighed 16 pounds. Its extreme length was 34½ inches, length from top of rostrum to tip of tail 19¾ inches. Both specimens were males. Neither of these lobsters lived more than a few days. It seems probable that their loss was the result of packing in ice during shipment. The first specimen was mounted for the Aquarium, the second sent to the American Museum of Natural History.

Octopus.—Upon the installation of the pure sea-water system several specimens of octopus were brought from Bermuda, none of which long survived injuries received during shipment. They had been, unfortunately, crowded into a single tank on the steamer which caused fighting, with the result that none of them escaped mutilation. Another lot was shipped too late in the season and all were lost on the way on account of the low temperature of the water.

Under the care of experienced persons these interesting animals can however, be transported safely, and further shipments will be made early in the summer.

Labels.—Up to the present time more than 200 labels have been prepared, so that the collections are well supplied with printed information. Most of the labels are illustrated with cuts, which make identification of species simple when two or more kinds are kept in the same tank. All labels are written in terse sentences and printed in large type.

ATTENDANCE.

The following table shows the attendance at the Aquarium in 1908 by months:

January	Number of visitors		146,428	Daily average	4,723
February	"	"	129,539	" "	4,466
March	"	"	183,592	" "	5,922
April	"	"	206,966	" "	6,898
May	"	"	236,958	" "	7,643
June	"	"	245,729	" "	8,191
July	"	"	324,486	" "	10,467
August	"	"	305,680	" "	9,860
September	"	"	284,124	" "	9,470
October	"	"	201,649	" "	6,504
November	"	"	142,326	" "	4,744
December	"	"	128,670	" "	4,150
Total			2,536,147	" "	6,948

The increase over the year 1907 amounted to 404,754.

The number of visitors for the twelve years of the Aquarium's history is now close to twenty-two millions, as shown by the following table:

1897	Visitors	1,635,252	Daily average	4,480
1898	"	1,689,471	" "	4,628
1899	"	1,841,330	" "	5,044
1900	"	1,585,584	" "	4,344
1901	"	1,644,856	" "	4,506
1902	"	1,700,453	" "	4,659
1903	"	1,547,873	" "	4,240
1904	"	1,625,770	" "	4,554
1905	"	1,726,170	" "	4,729
1906	"	2,106,569	" "	5,771
1907	"	2,131,393	" "	5,839
1908	"	2,536,147	" "	6,948
Total		21,770,868	" " 12 years	4,970

The records of attendance for the larger public museums of America and Europe present no such figures respecting visitors. Judging from the patronage of the public the Aquarium is the most popular institution in the world.

Fish Hatchery.—The United States Bureau of Fisheries has generously supplied from year to year fish eggs from Government trout, salmon, shad and whitefish hatcheries, for the maintenance of the Aquarium exhibit of fish culture. Eggs are received as different species come in season and the hatching trays, troughs and glass tanks show during most of the year fish eggs and young fishes of several kinds in various stages of development. The New York Fish Commission continues to remove to State waters the annual output of young fishes amounting to two or three millions.

The Aquarium fish cultural exhibit is an object of frequent inquiry and undoubtedly awakens an interest in the subject of private fish raising, which is an occupation of growing importance. Quite a number of men have sought information respecting the methods of fish growing and have availed themselves of the facilities afforded by the Aquarium library.

The Director's article on the "Cultivation of Fishes in Ponds," published by the New York Zoological Society, in its eleventh annual report, has been republished by the American Fisheries Society and by two magazines devoted to outdoor life, and permission to reprint has been given to the fishery commissions of four different States. Many of the fish culturists of the country re-

gard private fish raising as a matter of great importance in view of the widespread practice in America of polluting public waters. It is now considered by fishery officers that the continued pollution of our streams is rendering ineffective much of the important work of public fish propagation.

The Aquarium has been brought into close relation with this work through its fish-hatching exhibit, its large collections of living food fishes and its correspondence with the public at large. Another publication emanating from the Aquarium, entitled "The Pollution of Streams," has also been widely reprinted.

AID TO SCHOOL TEACHERS.

Small marine aquaria have been placed in more than 300 school houses in the city, the aquaria being furnished by the Board of Education, the animal collections by the New York Aquarium.

The work requires but a portion of the time of a single employee, while the animal life is supplied by the collector in connection with his regular field work. The furnishing of the material for school aquaria is thus only a nominal cost to the Aquarium.

Classes in biology accompanied by teachers continue to visit the Aquarium Laboratory where there are facilities for observing the smaller forms of marine- and fresh-water life.

The number of pupils and teachers thus accommodated during the year was 5,218, and the number of school aquaria stocked was 86. This work has been under the personal supervision of Mr. Spencer of the Aquarium staff.

International Fisheries Congress.—On the forenoon of September 28 the Fourth International Fisheries Congress, meeting for the first time in the United States, was specially entertained at the Aquarium. Most of the foreign delegates were surprised to find that New York maintained a distinctly larger and better-stocked aquarium than is to be found anywhere in Europe. It collects and succeeds in keeping aquatic forms, the exhibition of which is not attempted elsewhere. The Congress, after a very active meeting in Washington, spent a day in New York and then visited the principal fishing centers of New England. Delegates were present representing many countries. A splendid series of papers was presented relative to the promotion of fishery industries, the conservation of fishery resources, international fishery regulation, fish culture and biological research.

THE TEMPERATURE AND SALINITY OF THE WATER OF NEW YORK HARBOR AT THE BATTERY.

A glance at the following table shows that the monthly mean temperatures from June 1 to November 30 were distinctly higher in 1908 than those of preceding years for the same period. The monthly means of specific gravities show a higher density (salinity) from September 1 to December 31 than those previously recorded. The higher temperature and density of the water of the harbor during the past summer and autumn are undoubtedly due to the extreme dryness which prevailed during those seasons.

Although the new reservoir of stored sea water was put into regular use on July 9, some of the floor pools are still supplied with water from the harbor. In these pools the effect of the higher salinity was perceptible in the better condition of the fishes kept in them; although the results are in no way comparable with those secured in those tanks supplied from the reservoir. In the latter, the salinity has remained steady at about 1.021 and the water was moreover, absolutely pure and free from the bad effects of sewage with which the harbor water is permeated.

Record of monthly mean temperatures and specific gravities at the New York Aquarium during the years 1903, 1904, 1905, 1906, 1907, and 1908. (From daily observations made by Mr. W. I. DeNyse.)*

	1903		1904		1905		1906		1907		1908	
	Temp. water	Spec. grav.	Temp. water	Spec. grav.	Temp water	Spec. grav.	Temp water	Spec. grav.	Temp. water	Spec. grav.	Temp. water	Spec. grav.
January	...	.....	34	1.014	35	1.013	39	1.014	39	1.012	41	1.011
February	37	1.010	33	1.014	33	1.016	36	1.012	35	1.014	38	1.012
March	40	1.008	36	1.013	36	1.014	38	1.011	36	1.013	39	1.010
April	46	1.009	40	1.009	43	1.011	43	1.010	42	1.010	45	1.009
May	56	1.014	52	1.010	52	1.014	52	1.013	50	1.011	54	1.010
June	61	1.013	61	1.010	62	1.015	62	1.013	56	1.013	65	1.014
July	66	1.013	70	1.013	68	1.015	69	1.013	65	1.015	71	1.016
August	68	1.013	71	1.014	71	1.016	72	1.014	70	1.016	74	1.016
September	68	1.013	68	1.014	68	1.014	71	1.015	69	1.015	71	1.017
October	62	1.011	59	1.013	62	1.014	63	1.016	62	1.012	67	1.018
November	52	1.014	51	1.013	51	1.015	54	1.014	51	1.010	57	1.018
December	40	1.014	59	1.015	44	1.014	43	1.014	45	1.011	49	1.017

* Density observations were made with samples of water brought to a temperature of 60 degrees Fahr.

The chief interest which attaches to this record is the low salinity of the water of the harbor, as compared with that of the open sea, which is about 1.028.

The impurity of the harbor water and its low salinity have, until the present year, made the keeping of marine life in the Aquarium most difficult. Since the pure sea-water supply has been available the losses among marine animals in the tanks for the period from July to December, inclusive, have been reduced about 50 per cent. as compared with the same period of former years.

Never before have really large numbers of tropical fishes been carried through to the end of the year, and the numbers of such fishes now on hand encourage the hope that losses during the winter will be reduced to the minimum.

This record of six-years' daily observations is the only one of its kind that has been kept in the City, and, together with the record of specimens lost on account of bad water, throws light on the subject of the pollution of the harbor.

The time is approaching when fish life can not exist in the water of the harbor at all—when those lower forms of marine life which assist in the disposal of waste matter will themselves be dispersed.

Respectfully submitted,

CHARLES H. TOWNSEND,

Director.

PLATE I.

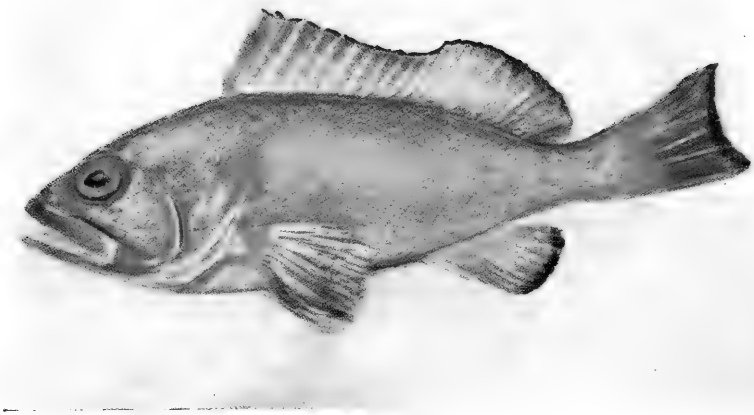


Figure I. Pale phase

Figure II. White banded phase

RED GROUPER (*Epinephelus morio*)

OBSERVATIONS ON INSTANTANEOUS CHANGES IN COLOR AMONG TROPICAL FISHES.

By CHARLES H. TOWNSEND.

NEARLY all the tropical fishes on exhibition in the New York Aquarium have the capacity of instantaneous changes in color according to their moods or artificial excitements, and their many phases of coloration and markings have become more noticeable under recently improved conditions of management.

Since July, 1908, sea fishes in the Aquarium have been kept in pure sea water supplied from a reservoir containing 100,000 gallons, the use of the brackish and impure water of the harbor having been abandoned, except in certain very large pools. The temperature and salinity of the water approximate those to which the fishes are accustomed in nature.

The glass-fronted exhibition tanks, some of which are eight feet long, are lined with artificial rockwork, and have the bottoms covered with sand or gravel, all of which assists in making the conditions of captivity decidedly favorable. The fishes spend much time resting among the rock crevices or on the white sand below.

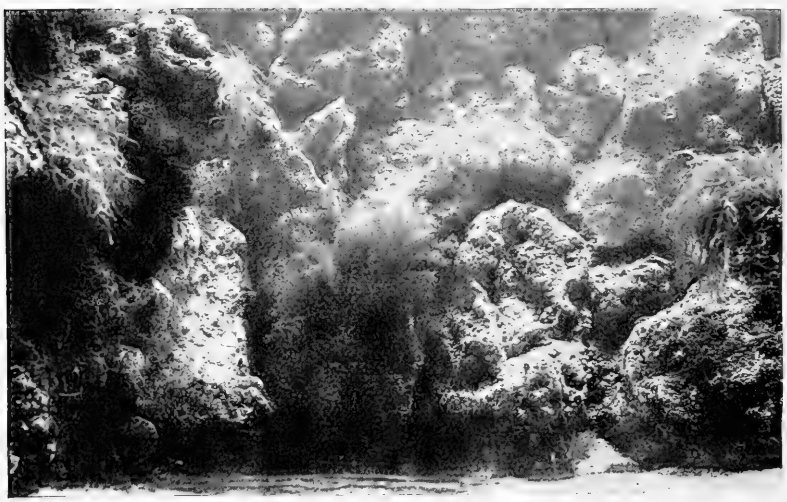
The various species of fishes from the Bermuda Islands are now maintained in better condition than ever before, and most of them have adapted themselves to captivity, feeding, playing or fighting in apparently natural ways.

It is well known that sea fishes habitually frequenting green or yellow seaweed acquire and maintain the general color tone of their habitat, and that trout from dark water are dark colored, while those inhabiting waters where there is sandy or gravelly bottom are light colored.

Such conditions have long been appreciated at the New York Aquarium, where fishes kept in tanks lined with white tiles, habitually wear their lighter colors, only an occasional blind fish remaining unchanged. The pale, colorless blind fishes of the Mammoth Cave gradually become darker when exposed to light in the Aquarium. These fishes, although with eyes practically useless, are still able to distinguish light from darkness. A specimen from Mammoth Cave which has lived in the New York Aquarium three years has gradually become quite dark.

PLATE A.

PORTABLE PHOTOGRAPHIC TANK.



N. Y. AQUARIUM EXHIBITION TANK.

One of the large floor pools contains twelve specimens of the striped bass (*Roccus lineatus*) which have never been moved since they were first placed in the pool fifteen years ago. This pool is lined with white tiles, and all the specimens are pale and colorless while their characteristic stripes are scarcely noticeable. The only normally colored fish in the lot is *blind,* and it is also undersized, since it has never been able to secure its full share of the daily supply of food.

Another white-tiled pool contains skates and rays, all of which became pale and colorless within two days of their capture, and ceased to exhibit their original rich brown tones. A newly arrived specimen is remarkably conspicuous when placed among them. The changes of color depend upon the eye.

In all these northern fishes, which reflect the tone of their surroundings, the changes are *slow,* requiring days or even weeks, but the color changes of tropical species are *sudden,* or actually *instantaneous.*

A year ago the following label was attached to all tanks containing fishes subject to quick changes in appearance:

"This species *may change color* at any moment.
A few minutes' observation of the fish is usually enough to reveal a change either in color or in pattern of marking.
The color cells of the inner skin are under the instant control of the fish.
Under natural conditions the changes of color are made chiefly for the purpose of concealment from enemies. They are also used for the capture of prey, for signaling, warning, mimicry, courtship and other purposes."

Through the agency of the label many of the visitors to the Aquarium learned to detect the changes, and found a new enjoyment in watching the more showy species.

The methods by which fishes produce changes in appearance are well understood. The color cells in the skin are contractile, and, as they may contain red, blue, yellow, or other pigment, the different colors result from muscular action upon one or more kinds of cells.

The fishes of tropical seas are usually of brilliant coloration, perhaps more so than tropical birds or butterflies, but their remarkable colors are not so well known, as they persist only during life. Outside of the tropics these fishes are to be seen nowhere, except in a few public aquariums.

Six months ago I began a series of daily observations on their colors, which have been continued to the present time. While the present article is merely a preliminary account of the behavior of certain tropical fishes with respect to the display of color, enough has been learned to show that many of those under

PLATE II.

Figure 1. Dark phase.

Figure 2. Banded phase.

NASSAU GROUPER, (*EPINEPHELUS STRIATUS*).

observation disport themselves habitually under phases of coloration which are apparently unrecorded in the standard works on West Indian species.

The accompanying photographs will temporarily serve to illustrate some of the aspects under which the fishes exhibit themselves, as far, at least, as can be done in mere black and white, without the aid of colored plates, which are not yet available. The only plate in color, that devoted to the red grouper, has been hastily prepared by the artist, by tinting the photographs taken from life. It has been reproduced by one of the cheaper processes, and is by no means as satisfactory a presentation of the species as could have been secured by lithography. It shows, however, two phases of color fairly well.

The ordinary photographs were secured by transferring fishes to a small portable tank, which could be carried into the sunlight. This tank is about fifteen inches in length and the same in height, but only four inches wide. Its use involves considerable handling of the specimens, and all photographs made with it show only those phases of color and markings which are peculiar to frightened and hiding fishes.

Photographs made in this way present but one, or, at best two phases of color. There seem to be difficulties in the way of photographing other phases, since they are displayed only when the fishes are undisturbed, in the large exhibition tanks, which are so large as to allow specimens to get out of focus. They are, moreover, too dark to permit of instantaneous photography, and the use of flashlight has not yet given satisfactory results, there being a lack of detail. Mr. Spencer's photograph of the red parrot-fishes (plate 5, fig. 3) is a fairly satisfactory flashlight, but the fishes were under some excitement and had sought the bottom of the tank. One individual in the rear had taken on the dark hiding colors, but the two large specimens in front were caught in half-mottled guises.

A study of the admirable photographs of West Indian fishes by Mr. A. R. Dugmore, published in *American Food and Game Fishes,* by Jordan and Evermann, shows that they are all pictures of the fishes in what may be called their hiding colors, and are, I am authoritatively informed, the results of photography with a small portable aquarium.

The objection may be raised that the color phases here described as habitual among fishes in the New York Aquarium are merely the results of captivity, but this is not the case. Our own photographic results from many of the same species are

PLATE III.

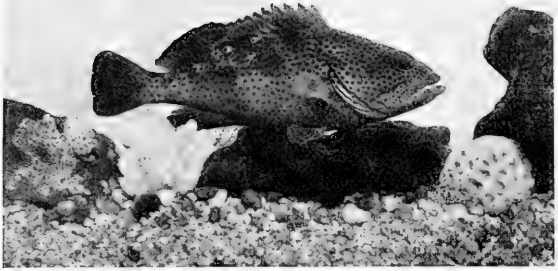


Figure 1. Dark red phase.

Figure 2. White-blotched phase.

RED HIND, (*EPINEPHELUS MACULOSUS*).

identical with those secured by Dugmore. Neither are they the results of gradual change, brought about by living in captivity, since changes of color occur hourly; in fact, may occur at any moment and are usually instantaneous. They begin to be in evidence within an hour of the arrival of new specimens, or as soon as they recover from the alarm caused by handling, and are produced as long as the fishes live in the tanks, which, in some cases, may be several years.

The markings in the Dugmore photographs, as well as those made in the New York Aquarium, are not those produced by mere excitement, but rather those caused by real alarm and the desire to hide. The markings and colors resulting from such moderate excitements as play, fighting, feeding, turning on of electric lights, etc., are quite different and have not yet been caught by the camera, portrayed by the artist, or recorded in the books.

The colors shown on many of the well-known colored plates of West Indian fishes are, therefore, not those of normal conditions, but rather those of dying, or dead and rapidly fading fishes. The colors so observed are the vestiges of the last color excitements of the fishes. Even if painted in a portable aquarium (as some of them were) from newly caught wild fishes, they show hiding or *alarm* colors only, and represent in each case merely one of several possible phases of coloration.

Fishes newly introduced to captivity do not remember their alarms very long, but emerge from their hiding places when quiet is restored. They soon show interest in life, by feeding, fighting and playing, and the observer in the New York Aquarium will quickly discover that the fishes habitually masquerade in colors and patterns which are apparently unknown to ichthyologists.

A little frightening of most of these fishes drives them to the lower or the darker portions of the tanks, where the hiding colors are maintained as long as the fishes try to conceal themselves. The turning on of artificial light usually has an enlivening effect on the fishes, many of them swimming nearer the surface and showing brighter color. It often has the effect of drawing all the specimens of certain species from the bottom to mid-tank or higher. Feeding produces a change in certain species, which may last for some time after they have ceased darting at the particles of food falling down through the water. With few exceptions, the various sudden changes of color occur in the young, as

PLATE IV.

Figure 1. Pale phase.

Figure 2. Dark phase.

RED PARROT-FISH, (*SPARISOMA ABILDGAARDI*).

well as in the adult specimens, and the heavily scaled parrot-fishes change as readily as the more lightly scaled red hinds or groupers.

During the latter part of February, 1909, I had the opportunity of seeing the fine collection of fishes living in the Bermuda Aquarium, where many of the tanks are as large as those in the New York Aquarium. Observations on the colors of fishes made in Bermuda served to confirm in general those made in New York, but the results were not always the same, due, perhaps, to the fact that none of the tanks were supplied with white sand bottoms or rockwork linings. Some additional phases, however, were noted.

The colors and markings are, to some degree, determined by the position of the fishes in the tank. When swimming in mid-tank the fishes are likely to have colors quite different from those assumed when resting against a dark background, while those displayed when at rest upon a bottom of white sand or gravel may differ from both.

In the following notes I have frequently referred to the colored plates published in *The Fishes of Porto Rico*,* by Evermann and Marsh. In reply to my letter of inquiry respecting the methods used by the artists, Messrs Hudson and Baldwin, in making the original paintings for these plates, Dr. Evermann writes: "Mr. Baldwin's work was done without an aquarium. Fresh, frequently living, specimens were put in his hands and he worked on them as rapidly as possible to get the colors before material change took place.

"The paintings by Mr. Hudson were all made in Key West. The fishes were kept in a small portable aquarium. He was able to get specimens readily from the live-wells of the fishermen's boats.

"The Hawaiian paintings† (about which I had also inquired) were made from live fishes kept in portable aquariums. The Samoan‡ fishes were painted from alcoholic specimens carefully preserved, color sketches being made from life at the time the fishes were collected."

Dr. Evermann's information as to the methods employed is important in connection with the observations recorded in the present paper, as it enables us to define the particular phases of color in each species which the plates show.

* Bulletin of the U. S. Fish Commission 1900.
† Bulletin of the U. S. Fish Commission, 1903.
‡ Bulletin of the U. S. Fish Commission, 1905.

PLATE V.

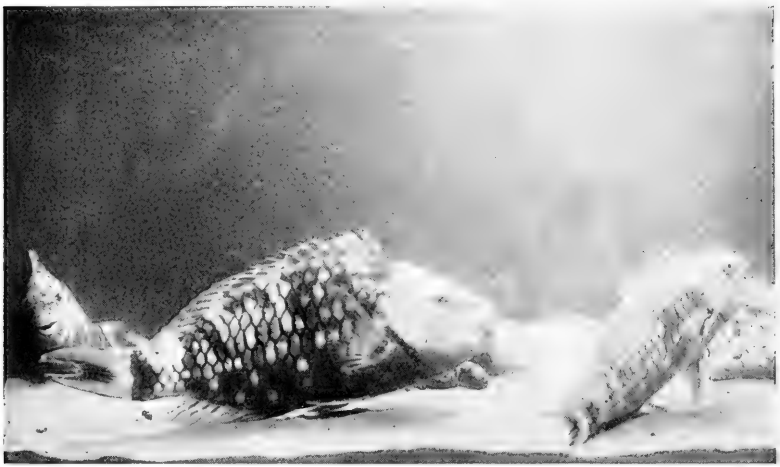


Figure 3. Dark (left), Pale (right).
Photo by L. B. Spencer.

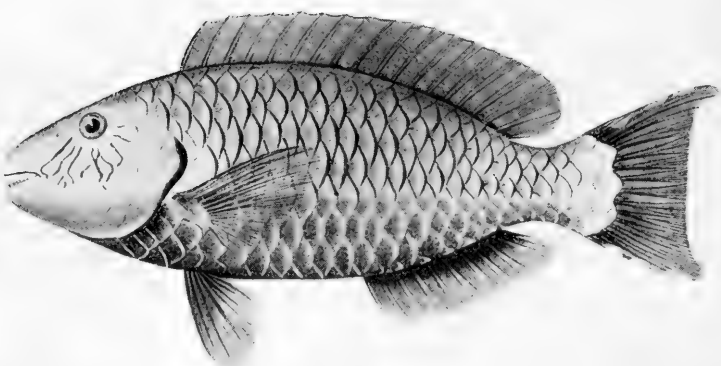


Figure 4. From plate 30, Fishes of Porto Rico.
Painted from a dead specimen.

RED PARROT-FISH, (*SPARISOMA ABILDGAARDI*).

The color plates painted with the use of the portable aquarium may, therefore, be classed with the photographs made by the same method. They show phases of color and markings exhibted by specimens more or less affected by fright. The plates reproduced from paintings of fresh, but rapidly fading dead specimens, may, if very quickly done, show color phases resulting from fright. Otherwise they can show only tints resulting from the slow relaxation of the color cells as the dying fish loses control of them.

While paintings and photographs of fishes made in the ways described above may present very well the colors and markings known to professional fishermen and to anglers—that is, colors exhibited by captured and frightened or dying specimens—the most of those with which we are acquainted do not portray the various species in the phases in which they exhibit themselves in life.

All illustrations of fishes which are capable of sudden changes in color should, with a view to scientific exactness, be accompanied with data respecting the phases of color shown, and the methods used in producing them. Color plates should never be made from dead fishes if living examples can be procured. It is equally important that similar data should accompany written descriptions of colors. The keeping of tropical fishes in public aquariums has now made possible some knowledge of their colors under normal conditions. In written descriptions in general, the familiar caption "*Color in life,*" is inexact, since it usually means merely the changing colors of a dying specimen.

It does not appear that there is any phase of color in the twenty-six species under observation, which can be called the permanent life color; frequent changes take place dependent upon activity, rest, play, anger, fright, temperature, food, light, or other causes. There are usually two or three phases of common occurrence, others being of less frequent appearance. The color changes are not necessarily connected with the breeding season, since they can be observed daily throughout the year.

In the following notes no attempt has been made to write out new systematic descriptions of each species, the object in view being merely to direct attention to the facts that all of the fishes observed have different colors and markings at different times, that most of the phases have been hitherto undescribed, that the changes from one phase to another are sudden, and to state briefly the general character of each phase.

PLATE VI.

Figure 1. Pale phase.

Figure 2. Black-finned phase.

YELLOW GRUNT, (*HAEMULON SCIURUS*).

Red Grouper, (*Epinephelus morio*). This species has many phases of coloration:

1. A common swimming phase, uniformly rich fawn color, with small irregular specklings of white on sides, which frequently disappear.

2. Pale olive brown, white bands of head and body distinct.

3. Pale olive brown, dorsal, caudal and anal fins narrowly black-edged, with faint margin of white (plate 1, figure 1).

4. Still paler, with a broad reddish brown band from snout through eye to near first dorsal, fins narrowly black-edged. No other marks.

5. White-banded phase: Body rich fawn color, the white bands of head and body thrown out sharply, fins narrowly dark-edged, with faint margin of white (plate 1, figure 2).

6. Dark-banded phase: Body pale olive, the fawn color becoming dusky, so that the fish appears light-colored with dark bands. It amounts almost to a reversal of phase 5.

Nassau Grouper, (*Epinephelus striatus*). Six phases of coloration are commonly observed in a tank containing several specimens of this species:

1. Uniform dark plumbeous, without markings of white (fig. 1, plate 2).

2. Uniformly creamy-white, without dark markings.

3. Dark plumbeous above, with pure white under parts up to the level of the pectoral fins.

4. Upper half of body sharply banded, lower half creamy-white.

5. In this phase the uniform dark coloration is deeply suffused with red, most noticeable in old and large specimens, and most distinct on head, but still subject to instant and complete suppression. Very large specimens often take on a rich fawn color, which suffuses the entire body.

6. Uniform dark plumbeous, the body irregularly banded and mottled with white. This is the phase shown in the colored plate by Hudson from life (plate 12, *Fishes of Porto Rico*), and in the photograph by Dugmore (*American Food and Game Fishes,* page 384). All photographs of this fish made in the photographic tank show this phase only (fig 2, plate 2). It is the phase usually assumed by the fish when at rest among the rockwork of the large exhibition tank, and can be produced in all the specimens instantly by frightening them. It is, however, no more the normal appearance of the fish than the uniformly dark, the uniformly white, or any other phase.

PLATE VII.

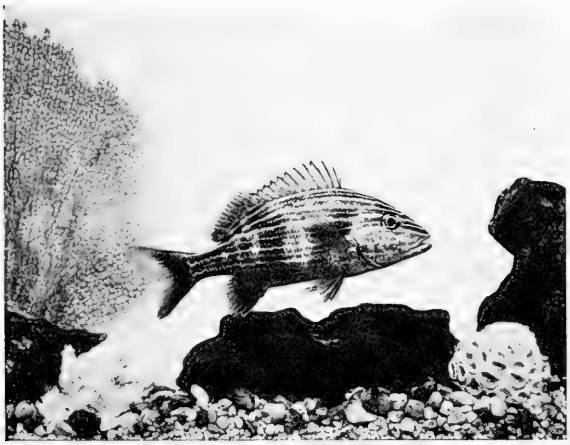


Figure 1.

YELLOW GRUNT, (*HAEMULON SCIURUS*).

Figure 2. Dark phase (left), striped phase (right).

RED-MOUTHED GRUNT, (*HAEMULON FLAVOLINEATUM*).

No two photographs of the banded phase are quite alike, the markings being apparently dependent upon the degree of handling to which the fish has been subjected.

Red Hind, (*Epinephelus guttatus*). Many phases. In this species the extremes of coloration are represented by a uniform and conspicuous redness, usually evident when the fish is in motion, but sometimes observable in the photographic tank, and a pale, red and white mottling when it is at rest. Between these there are many gradations of color and marking. In the first, or bright red phase, the spots are uniformly red on a dark red background. This is well shown in the plate opposite page 386 in *American Food and Game Fishes.* In the second, the ground color turns pale in places, giving a mottling of white, sharply spotted with red on both dark and light areas. This is a common resting or hiding color. In this phase the fins become pale. Another phase shows a pale ground color evenly spotted with red, the dark ground color entirely disappearing. This color is also developed when the fish is at rest or hiding, and dark fringes may appear on the tips of caudal, soft dorsal and anal fins.

Two phases are shown on plate 3.

Red Parrot-fish, (*Sparisoma abildgaardi*). To visitors this is the most interesting among the species subject to sudden changes in color. The changes occur frequently when the fishes are in motion and are decidedly marked in character.

In the brightest and most conspicuous phase (fig. 2, plate 4) there is a brilliant and nearly uniform red on the under surface and lower fins; the color comes like a sudden blush, reaching its intensity in two or three seconds. The sides and upper surface at the same time quickly turn very dark brown, especially on the margins of the scales, with the result that each scale is sharply outlined. In the second, fourth and sixth rows of scales, counting from the dorsal, each third, fourth, or fifth scale in the row remains pure white, giving the fish about sixteen regularly distributed white spots, which are very distinct in the dark phase, although not distinguishable in the pale phase. The head and the dorsal fin quickly become darker, the pale pink of the tail turns crimson red, its pale band becoming pure white.

In its palest phase the fish is almost colorless and nearly without markings, resembling a dead fish from which color has disappeared. A fairly pale phase is shown in (fig. 1, plate 4).

Sometimes when in the dark phase the swimming fish, espe-

PLATE VIII.

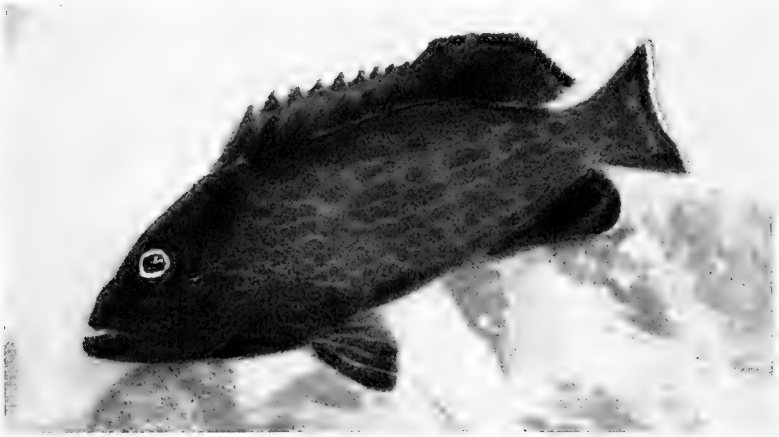


Figure 1. Dark phase.

Figure 2. Excitement phase.

YELLOW-FIN GROUPER, (*MYCTEROPERCA VENENOSA*).

cially if disturbed by its companions, will turn pale below, the red quite disappearing, while the darkness of the upper parts remains.

When the change from the dark to the pale phase takes place slowly, say in four or five seconds, the obliteration of the different marks and colors can be easily followed with the eye. More often the change is instantaneous. When the two extremes of coloration are shown in separate fishes, as is often the case, the casual observer naturally supposes there are two species in the tank.

Between the extremes of coloration there are several intermediate phases, one of which shows a pale fish, quite lacking the white scales and the red underparts, but with the free margins of all scales so dark that they are outlined with a distinctness not to be seen in any other species known to me.

The phase shown in the colored plate of this species (No. 38) in the *Fishes of Porto Rico* has not been observed in the Aquarium, even after repeated experiments in the large and small tanks. The painting was made from a dead fish and is herewith reproduced on (plate 5, fig. 4).

Fig. 1, Plate 4, shows the red parrot-fish in a half pale phase, with the white spots appearing faintly, all red color having disappeared. Fig. 2 is the same fish, photographed two minutes later, after the photographer had changed the plate. The rich brown color, white spots and gorgeous red were produced instantly for the benefit of the photographer by touching the fish with a stick. Both views were secured in the portable photographic tank.

A flashlight photograph by Mr. Spencer of the large exhibition tank shows the red parrot-fish in two additional phases to those described above; the left figure (plate 5) is a half-mottled dark phase, with the head pale and underparts red. The right figure, a slightly-mottled pale phase, only partly red below.

Another phase is sometimes assumed when the fish is at rest, the dark upper color and the red under color being separated by a pure white band extending from the upper jaw, through the eye to the lower half of the tail, the fringe of the opercle turning jet black.

The palest phase of this species was not observed in the tanks of the Bermuda Aquarium, probably because none of the tanks were supplied with white sand bottoms.

Green Parrot-fish, (*Sparisoma viridi*). This species while not capable of the many changes in color so constantly practiced

PLATE IX.

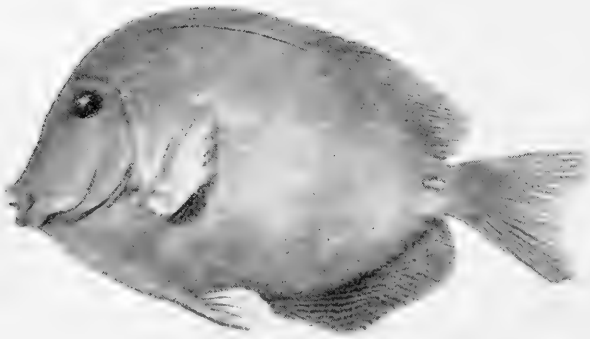


Figure 1. White phase

Figure 2. Blue phase.

BLUE TANG, (*TEUTHIS COERULEUS*).

by the red parrot-fish, (*Sparisoma abildgaardi*), has the power of greatly intensifying or obscuring its colors and markings. In its brightest and most showy phase the fish is of a uniform bright green color, with the border of the gill cover a brownish red, the same color appearing on the borders of all scales until they are outlined with remarkable distinctness.

In the hiding or resting phase of coloration the conspicuous green of the fish is obscured by much heavy mottling of brown, so much at times that the green disappears under the general suffusion of brown. This coloration is maintained as long as the fish remains quiet against a dark background.

Pigfish, (*Orthopristis chrysopterus*). Four phases:

1. The ordinary coloration is pale, without markings. This unmarked phase is fairly well indicated by the cut on page 434, *American Food and Game Fishes.*

2. Seven or eight irregular, vertical, dark bands, not unlike those of the tautog, (*Tautoga onitis*).

3. These bands are sometimes suddenly cut off at the level of the eye, the entire under parts turning white.

4. Another phase shows coloration under excitement. The vertical bands almost disappear and two longitudinal, broad, dark bands come out, the upper one extending from forehead to end of dorsal, following the curve of the body; the lower band straight, along median line from snout through eye to tail. The lower surface up to the median band is pale white. This coloration developed instantly in the larger fish whenever it began following and biting its former mate. The sexes were not distinguished.

Since a number of heavily banded tautogs were placed in the tank with a pigfish, the latter has worn its vertical bands habitually. This fact was noted and reported to me by several of the attendants, independently of my own observation. The pigfish has quite changed its habit of actively swimming about, and now usually rests in the bottom among the tautogs, from which a casual glance does not distinguish it, so nearly perfect is the mimicry.

Yellow Grunt, (*Haemulon sciurus*). This species when quiet, in mid-tank, is of a uniformly pale golden color with narrow, longitudinal stripes of blue.

If excited or alarmed two complete changes may take place: In the exhibition tank the whole school drops lower down, the soft dorsal fin and the most of the tail turning black. If one or more specimens are placed in the small photographic tank and

PLATE X.

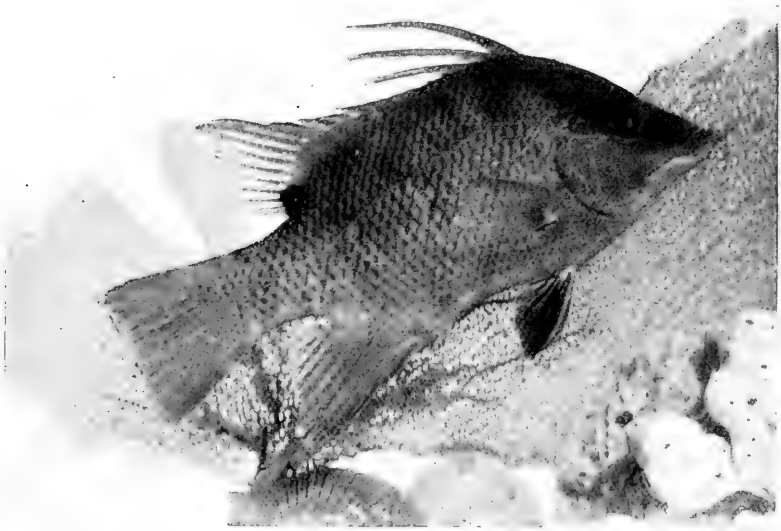


Figure 1. Dark brown phase.

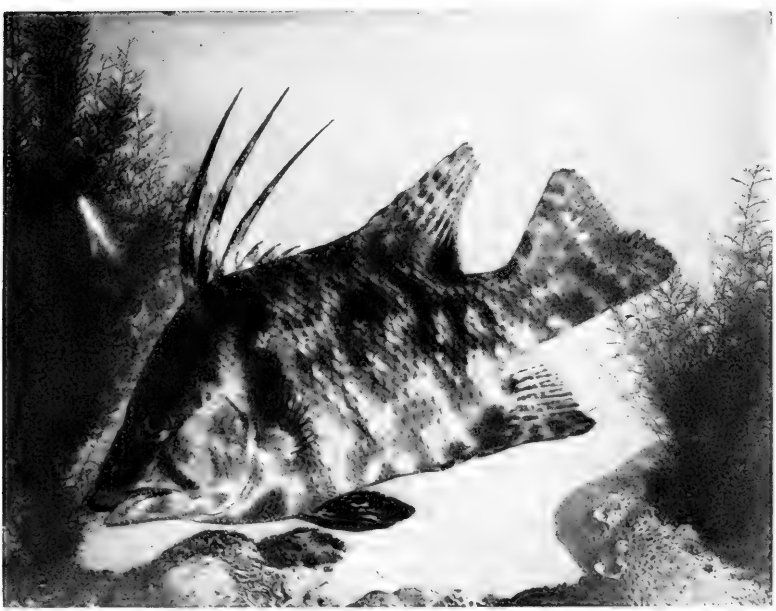


Figure 2. Mottled phase.

HOGFISH, (*LACHNOLAIMUS MAXIMUS*).

carried into the sunlight the fishes sulk upon the bottom, displaying, in addition to the black dorsal and tail, large irregular and very dark vertical blotches.

The customary swimming or mid-tank phase is shown in (fig. 1, plate 6). The phase with black fin and tail is represented in fig. 2 of the same plate. It is also shown in *American Food and Game Fishes,* plate opposite page 430. The small cut, fig. 1, plate 7, shows the mottled phase. The last is usually maintained as long as the specimen is kept in the small photographic tank, but sometimes disappears for a few moments.

Red-Mouthed Grunt, (*Haemulon flavolineatum*). Ordinary coloration in mid-tank. Uniform pale golden yellow, with narrow silvery stripes.

Coloration when alarmed: The whole school bunches together at the bottom, all immediately assuming a dark-mottled appearance, the ground color becoming so dark that the fish is completely changed. The dark blotches disappear at once when the disturbance ceases, the specimens, one after another, assuming their ordinary coloration, with, however, two lengthwise very dark bands, one extending straight from the snout through the eye to the tail, the other curved upward from the forehead to the end of the soft dorsal. These conspicuous bands show at intervals until the excitement caused by disturbing the fishes dies down.

When specimens are placed in the photographic tank a fourth phase, entirely dark, is assumed and retained. This is shown in the left figure of plate 7, while the phase with two longitudinal bands is shown in the right figure of the same plate. When these two specimens were placed in the photographic tank, both instantly assumed and retained the dark unmottled phase. The striped phase of the fish at the right was produced by touching it repeatedly with a stick.

Princess Rockfish, (*Mycteroperca bowersi*).* Three phases:

Bright-red phase: Pale red ground color with bright-red spots everywhere. Pectorals yellow, all other fins with black edges. A slight plumbeous mottling, making the upper surfaces darker than under. When this occurs—usually when the fish is in mid-tank and over gravel bottom—the plumbeous blotches become red along base of the dorsal and top of tail.

Dark-red phase: Usually assumed when the fish rests against the dark tank walls, the paleness of color deepens quickly to

* The identification of these specimens is not yet certain.

PLATE XI.

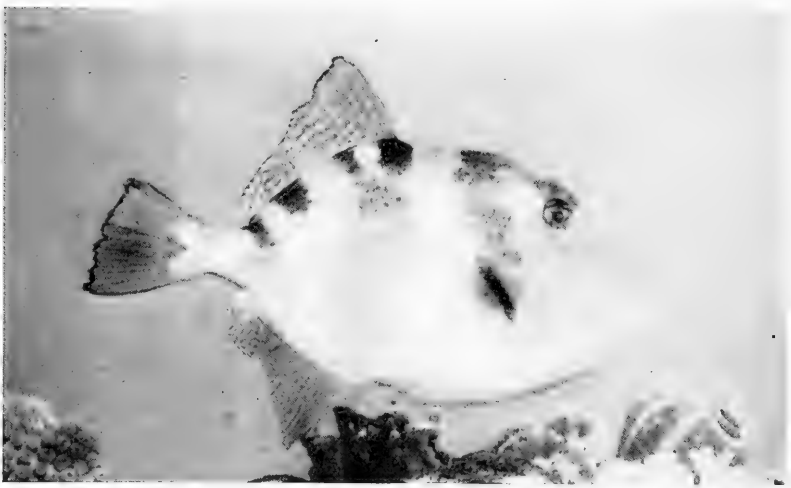


Figure 1. Half-banded phase.

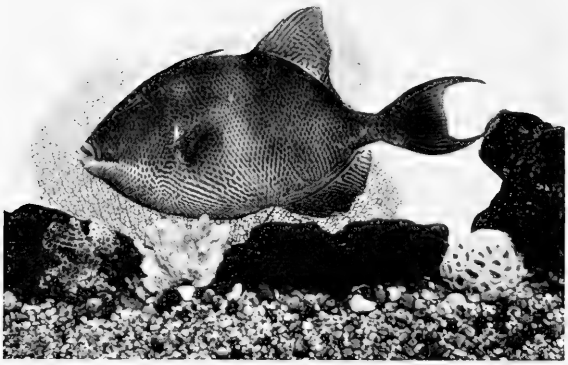


Figure 2. Dark phase.

TRIGGER-FISH, (*BALISTES CAROLINENSIS*).

dark reddish brown, yellow of tips of pectoral fins intensifies, also the black tips of dorsal, caudal, ventrals and anal. The red spots remain very bright.

Pale phase: The whole fish pale white with heavy black blotches.

Frequently all these phases may be observed in a single tank within five minutes, without artificial disturbance of the specimens.

Gag. (*Mycteroperca microlepis?*) Black phase: Uniformly dusky black; no marks anywhere.

Pale phase: Uniformly pale white, everywhere covered with irregular rings, ovals, half circles, triangles and blotches of dusky brown, extending partly on fins.

This species has also one or two intermediate phases.

Yellow-fin Grouper, (*Mycteroperca venenosa*). Pale phase: Uniformly pale white with mere indications of dark blotches down to median line. Below, small dark spots, also faintly indicated. All fins pale and colorless, with narrow dark margins composed of dusky spots on dorsal, caudal and anal. All red of body and yellow of pectorals absent.

Dark phase: Dusky gray, under parts spotted with bright red, pectorals tipped with clear yellow, all other fins heavily black-bordered, considerable red ground color on back and tail. Numerous dusky blotches on body.

Alarm phase: Same as preceding, but pale above median line, darker below. Red on under parts and tail more intense. Dark spots of lower body nearly uniting into large dark blotches. Dark spots of upper body intensely black.

These are the principal phases, but there are several others; one of which shows the body white below level of eye, with very dark blotches above. Two phases, one dark, the other a phase of the photographic tank, are shown on plate 8. The upper figure was colored by the artist from the same photograph as the lower.

Black Grouper, (*Mycteroperca bonaci*).* Phase 1. Uniformly creamy white, anal and caudal black-bordered, with an outside narrow edging of white.

Phase 2. Entirely pale, with about eight vertical blackish bands, each broken into three or four nearly square or rectangular areas.

Phase 3. Same as preceding, but with body white below level of eye, and fins dusky.

* The identification of this species is not yet certain.

PLATE XII.

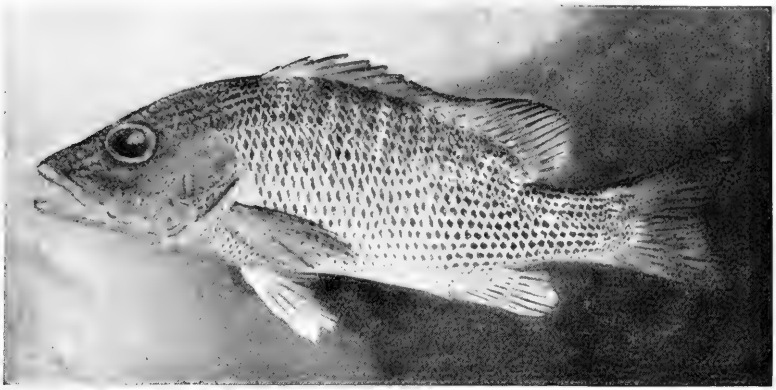


Figure 1. Ordinary phase.

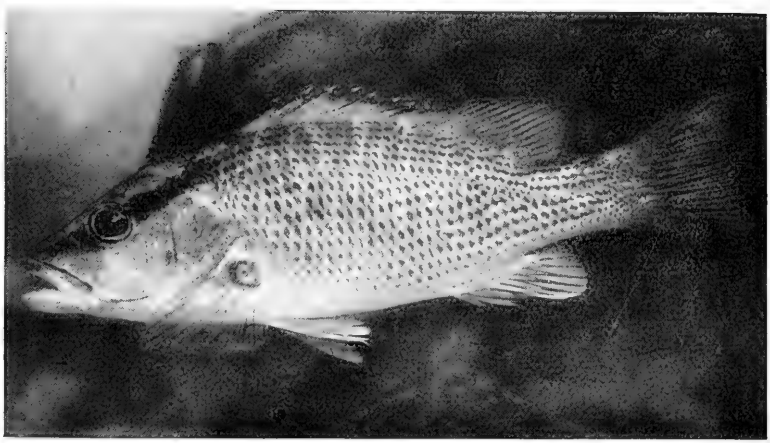


Figure 2. Excitement phase.

GRAY SNAPPER, (*LUTIANUS GRISEUS*).

Phase 4. Body dusky brown, heavily mottled everywhere—a phase connected with fright (see plate opposite page 392, *American Food and Game Fishes.*)

The above are the principal phases to be seen any day, but there are several variations.

Tiger Rockfish, (*Mycteroperca tigris*). Two phases are usually to be seen at the same time among the specimens in the exhibition tank. In one the general coloration is brownish, the bands which distinguish the species being pale and indistinct. Most of the brown effect is produced by very numerous brown spots everywhere.

In the other phase the body is almost black, the bands are pure white, and there is more or less white mottling on the tail. This coloration is the one assumed when the fishes are disturbed.

Blue Tang, (*Teuthis coeruleus*). There are two striking phases of coloration assumed by this species, one a bright blue, the other pure creamy white. In the latter there may be at times faint bluish margins to all the fins except the pectorals.

The blue phase is the one usually seen, since it is assumed whenever the fish is in the least disturbed by visitors passing the tank, and this lasts all day long (fig. 2, plate 9).

The other phase is seldom seen until the building is free from visitors, then the fish may settle down toward the white sand bottom and take on a ghostly whiteness (fig. 1, plate 9), but any disturbance instantly brings back the blue color.

No amount of experiment in the photographic tank ever produces anything but an intensely blue fish. The figure showing the white phase (plate 9) was made with the help of the engraver from a photograph of a blue specimen, it being impossible to photograph it.

Doctor Fish, (*Teuthis hepatus*). Pale phase; Pale white including pectorals and dorsal, the caudal and lower fins faintly bluish on the edges. Vertical bands faint.

Dark phase: Very dark, blue of fins almost obscured. A white band around caudal peduncle behind lancet. Vertical bands very dim.

Olive phase: Body and fins pale olive. Vertical bands sharp and distinct. Mouth white.

Coney or Nigger Fish, (*Bodianus fulvus*). This species is subject to many and frequent changes in appearance. A common resting color, shows the upper third of head and body very

dark brown, with small closely set specks of blue. All other parts, including whole of tail, pure white. The blue speckling is apparent on the white portions also when examined closely. This phase is shown in the photographic plate opposite page 382 in *American Food and Game Fishes,* but the tail is black.

In another phase the white invades the upper dark third, leaving about four dark blotches across back and dorsal, with irregular dark lines on head.

In a common swimming color the entire body is dark reddish brown, everywhere minutely speckled with intense blue.

A fourth phase shows upper and lower thirds of the body dark, the median third pure white. Blue dots indistinct.

In a fifth phase (in the photographic tank) the fish becomes a pale gray with the body dark blotched and the blue specks distinct.

The coney presents still other aspects of coloration, but the heavy blotches never appear except on a frightened fish, in the photographic tank.

Hogfish, (*Lachnolaimus maximus*). Three principal phases: Dark brown phase: Uniform pale reddish brown, whole front of head rich brown, a band of the same across base of the tail. A narrow band of this color extends also along the back at base of dorsal (fig. 1, plate 10).

Mottled phase: In the mottled phase there are equal amounts of reddish brown and pale white, both tints showing as nearly vertical bands on fins as well as body. When the fish is frightened the pale and brown mottling always appears, showing apparently a hiding color, with the fish usually in a corner of the tank and close against the rockwork (fig. 2, plate 10).

Phase 3: Whole body pale and colorless, only faint outlines of the brown marks showing.

Trigger-fish, (*Balistes carolinensis*). Four phases.

1. Sides and upper parts and all fins uniformly covered with fine bluish reticulations. Under surfaces white, upper dark.

2. Uniformly pale, with a yellowish cast.

3. Pale white, with broad, irregular, vertical bands on upper body, these sometimes forming black blotches close to dorsal (fig. 1, plate 11).

4. Uniformly dusky, bluish reticulations sometimes appearing faintly. This is fairly well shown in (fig. 2, plate 11).

Jolt-Head Porgy, (*Calamus bajonado*). Three common phases:

1. Uniformly dusky, unmarked.

2. Pale silvery, with a greenish cast, unmarked. (see upper figure on plate opposite page 438, *American Food and Game Fishes.*)

3. Color under excitement; same as preceding, but with five irregular, vertical bands of brownish black. Shown faintly in lower figure of the plate referred to. It is better defined on colored plate 25, *Fishes of Porto Rico,* but neither show the remarkably sharp bands affected by specimens in the New York Aquarium.

Sergeant Major, (*Abudefduf saxatilis*). Banded phase: Body pale, with five or six vertical black bands. Frequently the pale areas between the bands become yellow.

Dark phase: Body and fins nearly black, vertical bands on sides almost obscured.

Alarm phase (in the photographic tank): Same as preceding, but vertical bands more distinct, with a white band across forehead and a white blotch under eye.

Gray Snapper, (*Lutianus griseus*). Three phases:

1. Uniformly pale, dusky above, lighter on head and under surface (fig. 1, plate 12).

2. Uniformly dark olive brown, still lighter below.

3. Coloration under excitement: The whole fish becomes a shade darker, with a heavy black band, the width of the eye, extending from snout obliquely through eye to front of first dorsal fin. A narrow fringe of black appears on dorsal and anal fins (fig. 2, plate 12).

This is also fairly well shown in *American Food and Game Fishes,* on the plate facing page 432. The brilliantly colored phase on plate 17, *Fishes of Porto Rico,* has not been observed among specimens in the Aquarium, except as it has been indicated occasionally as a faint suffusion of color.

Schoolmaster, (*Lutianus apodus*). Ordinary coloration: Above dusky olive. Yellowish olive below and on all fins, no markings anywhere.

Excitement phase: Narrow vertical bands come out sharply on upper part of body. Feeding usually develops the bands distinctly.

Phase 3. The brilliant yellow coloration shown in plate 19, *Fishes of Porto Rico,* is probably correct, as the painting was made from a living fish held in the portable tank. This coloration probably results from fright, it has not been observed in

the large tanks of the New York and Bermuda Aquariums, and the specimens were not tested in the photographic tank.

Queen Trigger-fish, (*Balistes vetula*). This wonderfully marked fish has three phases of coloration: one dark, another pale and a third with the fins almost black. The usual blue markings persist in all three without change, except in intensity. In the dark phase, which is the customary dress, the head, below the blue lines, is rich golden yellow, all blue markings are brilliant, the body and fins dusky olive, especially above.

The pale phase is quite a change from this, the whole body becoming yellowish white, the blue markings still persisting faintly.

The coloration shown on plate 39, *Fishes of Porto Rico,* is that of a dead and half-faded specimen.

Live specimens observed in Bermuda frequently showed the fins black, the lower part of the body rich purplish blue.

Cow Fish, (*Lactophrys tricornis*). Phase 1: A uniformly pale or yellowish olive phase, with purplish blue reticulations very distinct.

Phase 2: Large, very dark blotches spread over body and tail, blue reticulations scarcely apparent.

Phase 3: Whole body light brown, blue reticulations becoming dusky.

Blue-Head, (*Chlorichthys bifasciatus*). Phase 1: Hinder half of body indigo blue, like the head, the black-bordered whitish band between, taking a bluish cast.

Phase 2: A sudden change from this leaves the hinder half of body pale greenish yellow, upper and lower rays of tail bluish black and the white band showing pure white.

"Cluck," (The Bermuda name) (*Eques acuminatus*). Pale phase: Pale silvery, the longitudinal rich brown stripes of body very distinct; first half of spinous dorsal rich brown.

Dark phase: Uniformly dusky brown on body and fins. Two or three darker vertical blotches occasionally appearing.

Note.—Mr. L. B. Spencer has kindly furnished photographs of yellow-fin grouper, hogfish, red-parrot and trigger-fish.

List of Gifts

TO THE ZOOLOGICAL SOCIETY.

From January 1, 1908, to January 1, 1909.

ANONYMOUS, New York City:
Slate-Colored Junco.
ARIZONA OSTRICH FARM, Phoenix, Ariz.:
Road-Runner (3 specimens).
ARLT, GERHARD, Chief Engineer, S. S. "Allegheny," New York City:
South American Iguana (3 specimens).
AUFOOT, GEORGE, Kingsbridge, New York City:
Chameleon.
BAISLEY, MRS. EUGENIA, New York City:
Alligator.
BAKER, HORACE, Kitchawan, New York:
Red-Shouldered Hawk, Red-Tailed Hawk.
BAUMANN, MASTER CHARLES, New York City:
Box Turtle, Spotted Turtle.
BEACH, REX, New York City:
Alaskan Black Bear.
BELLOSA, CHARLES F., New York City:
Alligator.
BENEDICT, RALPH C., New York City:
Cooper Hawk.
BERGGREE, ERNEST, Brooklyn, N. Y.:
Java Squirrel (2 specimens).
BLAKE, CAPTAIN H., New York City:
White-Tailed Deer.
BLOUNT, JR., F. R.:
Raccoon.
BOHNING, A., New York City:
Red Squirrel.
BORDEN, SETH A., Fall River, Mass.:
Canvasback Duck, American Crow (3 specimens).
BOWDISH, B. S, New York City:
Blue Jay
BRADFORD, MRS. C. H. D., Brooklyn, N. Y.:
White-Eared Bulbul (2 specimens)
BROWN, E., Hastings-on-Hudson, N. Y.:
Night Heron.
BROWN, ROBERT, Portchester, N. Y.:
Gray Fox.
BROWNING, WILLIAM H., New York City:
Bare-Throated Bell-Bird, Gray-Breasted Parakeet (3 specimens).
BURRELL, ALEXANDER M., Paymaster, Hamburg-American Line:
Caribbean Dove.
BÜTTNER, GUSTAV, Chief Steward, S. S. "Prinz Sigismund":
Anteater.
CALLEN, CASPER R., Brooklyn, N. Y.:
Alligator (2 specimens).
CAMERON, MRS. J., New York City:
Alligator.
CAREY, C. C., West Englewood N. J.:
Red-Shouldered Hawk.

Carson, Charles L., New York City:
Macaque Monkey.
Carter, Leslie T., New York City:
Albino Coyote.
Carver, William H., Brooklyn, N. Y.:
White-Faced Sapajou.
Cheney, Mrs. A. E., New York City:
Roseate Cockatoo.
Chevallaz, A., Brooklyn, N. Y.:
European Starling, Japanese Robin.
Chittenden, Simeon B., New York City:
White-Tailed Deer.
Clark, W. Campbell, Newark, N. J.:
Fox.
Coe, Miss M. S., New York City:
Red-Crested Cardinal, Red-Billed Hill Tit.
Condon, Thomas T., New Rochelle, N. Y.:
Marmoset (2 specimens).
Constantine, Robert, New York City:
Centipede, Cuban Iguana, Scorpion.
Cornell, J. S., Larchmont, N. Y.:
Alligator (4 specimens).
Crane, W. H., New York City:
Blue-Tailed Lizard, Scarlet King Snake, Chicken Snake
Curran, Mrs., New York City:
Box Turtle.
Curtis, F. C., New York City:
Song Sparrow.
Cushman, Master Merton, New York City:
Alligator.
Dale, Mrs. Annie Kellogg, New York City:
Golden Baboon.
Davies, C. Clarence, New York City:
Alligator.
Davis, Miss Aaron, New York City:
Horned Toad (2 specimens).
de Haas, E., New York City:
European Blackbird.
Devery, E. K., Hastings-on-Hudson, New York:
Night Heron.
Dewling, Andrew W., Baltimore, Md.:
White-Throated Sapajou.
Duke of Bedford, Woburn Abbey, England:
Kiang, or Tibetan Wild Ass.
Eberhard, Mrs., New York City:
Sora Rail.
Eden, W. C., Jersey City, N. J.:
Alligator.
Edwards, Cyril, First Officer, S. S. "Clan Macdonald":
Java Monkey.
Edwards, William, New York City:
Macaque Monkey.
Eggeling, O., New York City:
2 Climbing Perch, 2 Gurami, 2 Indian Catfish.
Engel, Miss Charlotte, New York City:
Marmoset.
Fenhauf, Mrs., South Brooklyn, N. Y.:
Blue-and-Yellow Macaw.
Ferrier, Henry, New York City:
Alligator.

FISCHER, GEORGE, Yonkers, N. Y.:
Gray Fox (2 specimens).
FORD, H. W., Morristown, N. J.:
Canary.
FRANKLIN, JOHN, New York City:
Gannet.
FRIES, MRS. ED., New York City:
Alligator (2 specimens).
FROEDER, GEORGE, New York City:
Yellow-Fronted Amazon Parrot.
GOEBEL, RICHARD, New York City:
Virginia Rail.
GOLDHORN, DR. L. B., New York City:
Spotted Snake.
GRAY, WILLIAM H., Yonkers, N. Y.:
Barred Owl.
GRIGRARD, MISS MARION, New York City:
White Rabbit.
GROAT, MRS. L. W., New York City:
Margay Cat.
GROSS, FRANK, New York City:
Wild Turkey (2 specimens).
GUCCIONE & COMPANY, D. J., New York City:
Badger.
HARMONY CLUB, THE, New York City (*through Mr. Henry W. Roemer*):
Capuchin Monkey (2 specimens).
HARRISON, E., Newburgh, New York:
Hawk.
HARVARD PSYCHOLOGICAL LABORATORY, Cambridge, Mass. (*through Dr. R M. Yerkes*):
Cebus Monkey (2 specimens).
HATCHER, JR., EDWARD, New York City:
Herring Gull.
HAVENS, AGNES A., Williamsbridge, New York City:
Ring-Necked Parrakeet.
HAYWARD, CAPTAIN, S. S. "Clan Macdonald":
Dusky Langur Monkey, Java Peacock.
HEINEMAN, L., New York City:
Gopher Tortoise (2 specimens).
HERREN, MRS. JOHN PAUL, Tarrytown-on-Hudson, New York:
Flying Squirrel (2 specimens).
HERZ, D., Dobbs Ferry, New York:
Snapping Turtle.
HICOK, DE LOS, West Brighton, Staten Island.
73 Striped Snakes, 16 De Kay Snakes.
HIGGINS, THOMAS F., Brooklyn, N. Y.:
Purple Gallinule.
HIPKINS, MRS. H., New York City:
Canary (3 specimens), Tovi Parrakeet.
HOLLOWAY, MISS ETHEL, Brookline, Mass.:
Alligator (4 specimens).
HORNIG, MRS. E., New York City:
Alligator.
HOWLAND, ELLA M., New York City:
Blue-and-Yellow Macaw.
HULSE, RICHARD J. E., New York City:
Margay Cat.
HURD, HARRY, New York City:
Angora Guinea Pig (3 specimens).

Hurter, Julius, St. Louis, Mo.:
Berlandier's Tortoise.
Husted, James W., Peekskill, N. Y.:
Hog-Nosed Snake (2 specimens).
Johnson, C. E., New York City:
Alligator.
Johnstone, E. R., Vineland, N. J.:
Coyote.
Just, George Frederick, Scarsdale, N. Y.:
White-Throated Sapajou (2 specimens).
Kaegebehn, Alfred, Hoboken, N. J.:
Ocelot.
Karr, A. H., New York City:
Yellow-Headed Amazon Parrot.
Kaufman, Fred., West Hoboken, N. J.:
Nine-Banded Armadillo.
Keator, Mrs. T. R., Bensonhurst, N. Y.:
Yellow-Headed Amazon Parrot.
Kennedy, W. F., Van Nest, New York City:
Blue-and-Yellow Macaw.
Kensler, Cornelius, New York City:
White-Fronted Amazon Parrot.
Kissam, C. H., Huntington, Long Island, N. Y.:
Banded Rattlesnake.
Klein, Alfred J., Tappan, N. Y.:
Ring-Necked Snake.
Kling, Mrs. C. P., New York City:
Western Mockingbird.
Koechling Brothers, New York City:
Tarantula.
Kohler, F., New York City:
Short-Eared Owl.
Koopman, John, New York City:
Angora Guinea Pig.
Kotzum, Henry J., New York City:
Canary.
Kraus, Henry, Brooklyn, New York City:
Alligator.
Krause, Captain Siegfried, S. S. "Prinz Eitel Freidrich":
South American Fox.
Krohn, Chris., New York City:
Great Horned Owl.
Lawrence, Townsend, Flushing, Long Island, N. Y.:
Broad-Winged Hawk.
Leiber, Mrs. C. A., New York City.
Yellow-Headed Amazon Parrot.
Leipert, Mrs. Lena, New York City:
Capuchin Monkey.
Lockwood, J. A., New York City:
Alligator.
Lunzer, Alois, New York City:
Yellow-Headed Amazon Parrot.
McComb, Miss Grace, Jersey City, N. J.:
Roseate Cockatoo.
McIntyre, Frank, Throgg's Neck, New York City:
Yellow-Fronted Amazon Parrot.
McLean, Alexander H., New York City:
Black Angora Guinea Pig.
Mahan, Lawrence, Hastings-on-Hudson, New York:
Green Heron.

MARSHALL, MRS. H. P., New York City:
Barbary Turtle-Dove (4 specimens).
MELCHERT, H., Hoboken, N. J.:
Golden Agouti.
MILLER, C. F., East Orange, N. J.:
92 Water Snakes, 42 Garter Snakes, 7 Wood Turtles, 3 Spotted Turtles, 3 Muhlenberg's Turtles, 5 Musk Turtles, 18 Painted Turtles, 12 Frogs, 17 Newts, 1 Salamander, 5 Ribbon Snakes, 44 Box Turtles, 24 Tadpoles, 32 Salt Marsh Frogs, 22 Pond Frogs, 2 Blacksnakes, 3 Wood Frogs, 2 Leopard Frogs, 2 Red-Bellied Water Snakes, 3 Bull Frogs Total, 339 specimens.
MILLER, WILLIAM, New York City:
Alligator.
MILSTEAD, R. H., Fishkill Village, N. Y.:
Raccoon.
MITCHELL, WILLIAM, Chief Engineer, S. S. "Kaiserin Auguste Victoria":
Box Tortoise.
MORRIS, C. H., McConnelsville, Ohio:
Great Blue Heron, Copperhead Snake
MURPHY, THADDEUS, New York City:
Alligator.
NEFF, HAROLD F., Bedford Park, New York City:
Alligator (2 specimens).
NEFF, MISS HARRIETT AGNES, Brooklyn, N. Y.:
Raccoon.
NELSON, MISS OLGA, New York City:
Sora Rail.
NORTON, GEORGE F., New York City:
Glaucous Gull (2 specimens).
O'CONNOR, MAURICE. Brooklyn, New York City:
Mexican Gray Fox.
OSTRANDER, CARLOS E., New York City:
Spider Monkey.
PEAVEY, ROBERT W., Brooklyn, New York City:
9 Hog-Nosed Snakes, 2 Spotted Turtles, 1 Painted Turtle, 1 Milk Snake, 1 King Snake, 1 Ring Snake, 1 Ribbon Snake, 1 Bull Frog. Total, 17 specimens.
PHILLIP, ALFRED R., New York City:
Box Tortoise.
POST, GEORGE A., Richmond Hill, Long Island, N. Y.:
English Rabbit (2 specimens).
RICHARDSON, JENNESS, New York City:
1 Garter Snake, 1 Hog-Nosed Snake, 3 Spotted Turtles.
RIES, WILLIAM, New York City:
Texas Rattlesnake.
RILEY, ARTHUR B., New York City:
Wood Tortoise.
ROCKEFELLER, WILLIAM, New York City:
Sarus Crane.
RODERICO, MISS TRIXIE, Hoboken, N. J.:
African Rock Python.
ROE, MRS. THOMAS L., Patchogue, Long Island, N. Y.:
Marmoset.
ROOSEVELT, S. M., New York City:
Virginia Opossum (2 specimens).
RUNYON, E. W., New York City:
Bushmaster.
RÜTHLING, DR. HENRY H., New York City:
1 Cumberland Terrapin, 2 Striped Snakes, 2 Pond Frogs.

SAUNDERSON, MR. and MRS. ARMAR D., Tarrytown, N. Y.:
2 Lion Cubs.
SAWYER, E. J., Lincklaen Center, N. Y.:
Red-Tailed Hawk.
SCHAVOIR, MRS. D. F., Stamford, Conn.:
Brown Grackle.
SCHNEIDER, J. H. ARTHUR, New York City:
Virginia Opossum.
SCHOLLER, E., New York City:
Red-Shouldered Hawk.
SCHOONHAVEN, MASTER GEORGE, Brooklyn, N. Y.:
Alligator.
SCHUHMACHER, ALBERT, New York City:
Screech Owl.
SEARLES, L. M., Portchester, N. Y.:
Florida Gallinule.
SEITZ, MRS. H., New York City:
Tortoise.
SHELDON, MRS. R. S., New York City:
Yellow Grass Parrakeet (4 specimens).
SIDNEY, MRS. GEORGE, Point Pleasant, N. J.:
Capuchin Monkey.
SIEBRECHT, HENRY ACKER, New Rochelle, N. Y.:
Cotton-Headed Marmoset (2 specimens).
SILVERBERG, MAURICE, New York City:
Alligator.
SMEND, DR., S. S. "Chemnitz":
Virginia Rail.
SMITH, HOWARD CASWELL, New York City:
Japanese Waltzing Mice.
SOLARES, MR., New York City:
Canary.
SPERZEL, ELIZABETH, New York City:
Ring Dove.
STEWART, M. L., Fordham, New York City:
Alligator.
STOCKWELL, MRS. F. C., Brooklyn, N. Y.:
Box Turtle.
STOKES, MRS. HORACE, Hackettstown, N. J.:
White-Browed Amazon Parrot.
STONE, FRED. A., New York City:
Alaskan Black Bear.
STRASSMAN, MISS DOROTHY M., New York City:
Box Turtle.
STRATTON, REV. K. M., Fishkill, N. Y.:
Raccoon.
STREETER, JR., D. D., Brooklyn, N. Y.:
Pilot Blacksnake.
SULLIVAN, MRS. M. F., New York City:
Yellow-Fronted Amazon Parrot.
SUSSER, JOHN M., New York City:
Great Horned Owl.
SUXDORF, CAPTAIN, S. S. "Gunther":
Chopi Boat-Tail.
TARBLES, MRS. J., New York City:
American Robin.
TARBOX, MISS CORA I., Essex Junction, Vt.:
Baltimore Oriole.
TAYLOR, G. M., New York City:
Tovi Parrakeet (2 specimens).

THÜMMLER, FRITZ, New York City:
Tovi Parrakeet (2 specimens).
TODD, DR. A. S., Manning, S. C.:
Blacksnake.
TOWNSEND, C. H., New York City:
Northern Yellow-Throat.
TRAVELLI, MRS. CHARLES I., West Newton, Mass.:
Purple Gallinule.
TURNER, MRS. C. H., New York City:
White-Fronted Amazon Parrot.
TURNER, MISS EMILY, New York City:
White-Fronted Amazon Parrot and Cage.
TURNER, J. L., Whitestone, Long Island, N. Y.:
White Rat (2 specimens).
URBANSKI, MRS. AGNES, New York City:
White-Fronted Amazon Parrot, American Crow.
VALLETTE, S. E., New York City:
Java Monkey.
VAN DER SMISSEN, MRS. GILBERT J., New York City:
Alligator (2 specimens).
VAN TASSEL, MRS. H. C., Yonkers, N. Y.:
Macaque Monkey.
VAN WICKEL, E. S., Sound Beach, Conn.:
Red-Tailed Hawk.
VOLLBERG, JOHN, New York City:
Sparrow Hawk.
WAGNER, GEORGE A., New York City:
Snapping Turtle.
WALSH, MICHAEL T., New York City:
Tovi Parrakeet (2 specimens).
WARD, R. E., New York City:
Blue-Fronted Amazon Parrot.
WATTS, M. H., New York City:
Alligator (2 specimens).
WELSH, JACOB, Fairmount, N. J.:
Jumping Mouse.
WESLEY, MRS., New York City:
Tovi Parrakeet.
WHITMAN, CLARENCE, Katonah, New York:
3 Reeve's Pheasants, 1 Golden Pheasant, 1 Silver Pheasant, 1 Amherst Pheasant, 2 Ring-Necked Pheasants. Total, 8 specimens.
WIEDERHOLD, MRS. MAX, New York City:
Blue-Fronted Amazon Parrot.
WILSON, WILLIAM S., New York City:
Box Turtle.
WOLOFF, MRS. A., New York City:
Alligator.
WORK, HORACE H., Madison, N. J.:
White-Tailed Deer.
ZANDER, GUSTAV, New York City:
Diamond-Backed Rattlesnake.
ZIPF, MRS. M., New York City:
Nighthawk.

Gifts of Plants.

COLGATE, MRS. S. F., Yonkers, N. Y.:
2 large Seaforthia Palms.
ZIEGLER, ESTATE OF WILLIAM, New York City (*through Mr. W. S. Champ*):
1 large Fan Palm.

Miscellaneous List.

Boulton, Bliss & Dallett, Red D. S. S. Line, New York City:
Transportation of 14 cages of animals from La Guayra, Venezuela, to New York.

Pabst Brewing Company, New York City (*through A. F. Stoeger*):
10 empty kegs, for bears and elephants.

The Winchester Repeating Arms Company, New Haven, Conn. (*through Winchester Bennett, Second Vice-President*).
Winchester Rifle, calibre 405, leather case and cartridges.

Gifts to the Library.

Beebe, C. William, New York City:
Ricerche Sulla Morfologia Dello Piuma. By Alessandro Ghigi.

Ehrich, Howard, New York City:
The Gardens and Menagerie of the Zoological Society (London). Volume I, Quadrupeds; Volume II, Birds.

Hornaday, William T., New York City:
Camp-Fires on Desert and Lava. Hornaday.

Lawrence, Townsend, Flushing, Long Island, N. Y.:
The Man-Eaters of Tsavo. Patterson.

Osborn, Henry Fairfield, New York City:
Evolution of Mammalian Molar Teeth. Osborn.

Russ, Edward, Hoboken, N. J.:
On Safari.—Big Game Hunting in British East Africa. Abel Chapman.
Camps and Cruises of an Ornithologist. Frank M. Chapman.
Across the Sub-Arctics of Canada. J. W. Tyrrell.
Through the Mackenzie Basin. Charles Mair and R MacFarlane
Report of the New Jersey State Museum for 1907—Mammals of New Jersey (3 copies).
The Birds of New Jersey.

Wack, Henry Wellington, New York City:
The Story of the Congo Free States. H. W. Wack.

Ward, Rowland, London, England:
The Game Animals of Africa. R. Lydekker.

List of Gifts

TO THE NATIONAL COLLECTION OF HEADS AND HORNS.

(*April* 1, 1908, *to April* 1, 1909.)*

BILLINGS, F. S., Woodstock, Vt.:
Big-Horn Mountain Sheep. Mounted head of lamb.

BRADLEY, J. R.:
Ibex. Mounted head.

CAUGHNAWANA FISHING AND HUNTING CLUB, of Quebec, Canada (through W. J. Buttfield, New York City):
Canadian Moose. Mounted head (65 inches spread).

DISSTON, JR., HENRY, Philadelphia:
Derby Eland, (*Taurotragus derbianus*). Male. Horns. 43 inches. (World's record.) Also one smaller pair.

EDWARDS, HARRY, Fairbanks, Alaska:
2 Osborn Caribou. Antlers.

FUGUET, HOWARD, Philadelphia, Pa.:
Black-Faced Caribou. Mounted head.
Grizzly Bear Skull.

GOULD, GEORGE J.:

THE DONALDSON SMITH COLLECTION.

INDIA.

Sloth Bear, (*Ursus labiatus*). Mounted head.
Indian Bison, or Gaur, (*Bos gaurus*). Mounted head.
India Buffalo, (*Bos arni*). Mounted head.
Tiger, (*Felis tigris*). Mounted head.

AFRICA.

African Elephant, (*Elephas africanus*). Pair of tusks.
1 tusk 7 feet 5 inches; weight 108 pounds;
1 tusk 7 feet 3 inches; weight 100 pounds.
Ruppel's Reedbuck, (*Cervicapra bohore*). Mounted head.
Rhinoceros, (*Rhinoceros bicornis*). Mounted head.
Colobus Monkey, (new species), (*Colobus guereza poliura*). Mounted.
Warthog, (*Phacochaerus africanus*). Mounted head.
Giraffe, (*Giraffa camelopardalis neumanii*). Mounted head.
Speke's Gazelle, (*Gazella spekei*). Mounted head.
Topi Antelope, (*Damaliscus jimela*). 2 specimens: 1 head.
Lelwel Hartebeest, (*Bubalis lelwel*). 2 specimens: head and skull and horns.
Grevy Zebra, (*Equus grevii*). Mounted head.
Dik-Dik Antelope, (*Madoqua guntherii smithii*). Mounted head. (Subspecies named in honor of Dr. Smith.)
Defassa Waterbuck, (*Cobus defassa stefanicus*). Mounted head.
Abyssinian Buffalo, (*Bos equinoctialis*). Mounted head.

Waller's Gazelle, (*Lithocranius walleri*). 4 specimens: 3 heads, and 1 young specimen.
Lesser Kudu, (*Strepsiceros imberbis*). Mounted head.
Grant's Gazelle, (*Gazella grantii*). Mounted head.
Bright's Gazelle, (*Gazella grantii brightii*). 6 specimens: 1 head, 4 pairs of horns, 1 female.
Soemmering's Gazelle, (*Gazella soemmeringii*). 7 specimens: 1 male mounted head, female skull and horns, 5 pairs of horns.
Beisa, (*Oryx beisa*). 5 specimens: 1 female mounted head 1 male mounted head, 3 pairs of horns and skulls.
African Black Rhinoceros, (*Rhinoceros bicornis*). 5 pairs of horns.
Hippopotamus, (*H. amphibius*). 2 specimens: lower jaw, and pair of tusks.
Swayne's Hartebeest, (*Bubalis swaynei*). 3 specimens: skull and horns.
Reedbuck, (*Cervicapra redunca*). Horns.
Peter's Gazelle, (*Gazella petersi*). Horns.
Coke Hartebeest, (*Bubalis cokei*).
Thomson's Gazelle, (*Gazella thomsonii*). 2 specimens: female.

HART, FRANK, Doylestown, Pa.:
Colorado Mule Deer. Skull and horns.
Arabian Ibex. Skull and horns.
Malayan Sambar Deer. Horns.
Persian Wild Goat. Skull and horns.
Japanese Sika Deer. Skull and horns.
Grant's Gazelle. Skull and horns.
Tragelaphus. Skull and horns.
Schomburgk's Deer. Skull and horns.
Siberian Roe. Skull and horns.
Pampas Deer. Skull and horns.
Clarke's Gazelle. Horns.
Sambar Deer. Horns.

HOUSE, E. J., Pittsburgh, Pa.:
Atlantic Walrus. Young Bull. Mounted head.
Rhinoceros. Mounted head.
Burchell Zebra Mounted head.
Grevy Zebra. Mounted head.
Three-Horned Giraffe. Unmounted head.
Osborn Caribou. Unmounted head
Mountain Goat. Female. Unmounted head.

LARNED, EDWARD P., Summit, N. J.:
Atlantic Walrus. Skull of female.

LODER, SIR EDMUND GILES, Leonardslea, England:
Loder's Gazelle (*Gazella loderi*). Male.
Tibetan Shou, or Sikkim Stag, (*Cervus affinis*). Antlers.

MADEIRA, PERCY C., Philadelphia, Pa.:
Hippopotamus. Female. Mounted head.
Steinbuck. 2 unmounted heads.
Zebra. Unmounted head.
Oribi. Mounted head.
Dik-Dik. Mounted head.
Duiker. Two mounted heads.
Hartebeest. Mounted head.

MITCHELL, HON. MASON, American Consul, Apia, Samoa:
Snow Leopard. Skin rug.
Clouded Leopard. Skin rug.
Common Leopard. Skin rug.
Mitchell's Lynx. Skin rug.

NORTON, GEORGE F., New York:
1 Pair Tusks of Atlantic Walrus.
1 Narwhal Tusk.
Addax. Horns.
Series of Panorama Photographs of scenery in Lower California.

PHILLIPS, JOHN M., Pittsburgh, Pa.:
Rocky Mountain Goat. Unmounted head.

POTTER, WILSON, Philadelphia, Pa.:
Big-Horn Mountain Sheep. Male. Mounted head.
54 Photographs of scenery and mountain sheep in Lower California.

RADCLYFFE, PERCY, London, England:
Marco Polo's Sheep, (*Ovis poli*). Male. Unmounted head and horns.

RUNGIUS, CARL, Brooklyn:
Wyoming Moose. Antlers and skull.

SENFF, CHARLES H.:
Interlocked Moose Antlers from Alaska.

WACK, HENRY WELLINGTON:
Atlin Moose. Mounted head .

Gifts to the Aquarium

BOILENBURG, MASTER SEYMOUR, Brooklyn, N. Y.:
Snapping Turtle.
BROWN, C. E., Highland, Ulster Co., N. Y.:
Mud Puppy.
BRUCE, E. K., Thornburg, Iowa:
3 Mud Puppies, 13 Fancy Gold Fishes.
CARR, CHRISTOPHER, Brooklyn, N. Y.:
Painted Turtle.
CHARLEBOIS, ALBERT, Hoboken, N. J.:
Yellow-Bellied Terrapin.
CLAIR, MISS AGNES, New York City:
Painted Turtle.
DAHLSTROM, N. R. T., U. S. S. "Mayflower,"
Painted Turtle.
DAVIS, A. B., Wading River, L. I.:
Two-year-old Brook Trout (19 specimens).
DAVIS, WILLIAM, Staten Island, N. Y.:
Collection of Water Beetles.
EBERLIN, F. C., New York City:
Young Alligator.
EGERLAND, ALEXANDER, New York City:
Young Alligator.
FAY, RICHARD S., Newark, N. J.:
Young Alligator.
FISHER, THEODORE, Staten Island, N. Y.:
Blue Crab with Mussels attached to back and claw.

Forest, Fish and Game Society (Sportsmen's Show), New York City:
13 Channel Catfish, 8 Mudfish, 7 Calico Bass, 11 Sunfish, 2 Brook Suckers, 9 Pike, 25 Rock Bass, 87 Brook Trout, 1 Lake Herring, 5 Bullheads, 10 Burbot, 15 Wall-Eyed Pike, 40 Rudd, 17 Blue-Gilled Sunfish, 53 Short-Eared Sunfish, 4 Mirror Carp, 16 LargeMouthed Bass, 22 Yellow Perch, 3 Lake Whitefish.

Foster, John S., New York City:
Snapping Turtle.

Foster, M. G., New York City:
Mounted specimen of Tuna.

Gallup, Miss Anna B., Brooklyn, N. Y.:
Young Alligator (4 specimens).

Gignoux, The Misses Louise W. and Mildred, New York City:
Slider Terrapin.

Goldstein, Isaac, New York City:
Spotted Turtle.

Goulding, Harry, New York City:
Painted Turtles (7 specimens).

Grepe, Master Fred., Brooklyn, N. Y.:
Young Alligator (2 specimens).

Hazel, William, New York City:
Yellow-Bellied Slider.

Holby, Messrs. Lewis, Morrel and Vernon, New Rochelle, N. Y.:
Collection of Sea Anemones, Starfishes and Sea Squirts.

Hussey, E. A., New York City:
Young Alligator (2 specimens).

Keller, E. F., New York City:
Striped Catfish from India.

Kennedy, John, Jr., New York City:
Diamond-Backed Terrapin.

Knowles, E., New York City:
Young Alligator.

Kuhn, John C., New York City:
Green Turtle.

Lesch, John, New York City:
Box Turtles (4 specimens).

Levy, Master L., New York City:
Box Turtle.

Levy, F. B., New York City:
Spotted Turtle.

Mack, William, New York City:
Fancy Gold Fishes (2 specimens).

Mayer, Dr. A. G., Dry Tortugas, Florida:
Collection of Land Crabs and young Loggerhead Turtles.

Mayward, Miss M. G., Orange, N. J.:
Young Alligator.

Meyre, Diedrich, New York City:
Young Alligator.

Miller, James, Hoboken, N. J.:
Snapping Turtle.

Newman, E. W., Brooklyn, N. Y.:
Diamond-Backed Terrapin.

Nikich, Nilan, New York City:
Painted Turtle.

NORTER, CAPTAIN NICK, Brooklyn, N. Y.:
Flounder.

PAGE, MR. BRETT, Brooklyn, N. Y.:
Young Alligator.

PARADISE BROOK TROUT CO., Paradise, Pa.:
5,000 Brook Trout Eggs.

PHILLIPS, MASTER THOMAS, New York City:
Spotted Turtles (2 specimens).

RECCIO, REV. LOUIS, New York City:
Box Tortoise.

REDFIELD, MASTER EDWARD, Closter, N. J.:
36 Salamanders, Wood Turtle.

ROCKWOOD, WILLIAM H., New York City:
2 Long-Eared Sunfish, 4 Yellow Perch, 3 Shiners, 1 Short-Eared Sunfish.

SAGER, MR., New York City:
1 Black Bass, 3 Sunfish.

SCOTT, CHARLES A., Brooklyn, N. Y.:
Young Alligator.

SEGNINE, FLEETWOOD, New York City:
Painted Turtle.

SINGER, GUS, New York City:
Young Alligator.

SMITH, A. J., New York City.
Alligator.

ST. JOHN, MR., New York City:
Mantis Shrimp (2 specimens).

STRASBURGER, J., New York City:
Young Alligator.

SULLIVAN, JOHN, New York City:
Young Alligator.

TAYLOR, WILLIAM, New York City:
Box Turtles (2 specimens).

TRUSHEIM, ALBERT, Brooklyn, N. Y.:
Box Turtle.

TUTTLE, H. A., Centerport, Long Island, N. Y.:
Specimens of Oyster attached to pipe.

TUXEDO CLUB, Tuxedo, New York (*through Mr. E. C. Kent*):
Steelhead Trout (1,000 specimens).

U. S. FISHERIES BUREAU, Washington, D. C.:
10,000 Trout Eggs, 1,000,000 White Fish Eggs, 20,000 Quinnat Salmon Eggs, 1,000,000 Pike Perch, collection of Fresh-Water Mussels from Mississippi River.

WERNICH, JOSEPH, Brooklyn, N. Y.:
Painted Turtle.

WAGNER, R., New York City:
Painted Turtle.

WALSH, JOHN, Brooklyn, N. Y.:
Box Turtle.

WARREN, DR. JOHN, New York City:
Young Alligator (2 specimens).

YOUNG, MRS. E. N., Brooklyn, N. Y.:
Young Alligator (2 specimens).

Gifts to Aquarium Library

CARNEGIE INSTITUTION, Washington, D. C.:
Handbook of Learned Societies.

HARGITT, PROF. CHARLES W., Syracuse University, Syracuse, N. Y.:
Pamphlets on Zoology.

HOEN, MESSRS. A., & Co., Baltimore, Md.:
16 Colored Plates of Fishes of North Carolina.

NEW JERSEY STATE MUSEUM (*through S. R. Morse, Curator*), Trenton, N. J.:
Report, New Jersey State Museum.

NEW YORK FOREST, FISH AND GAME COMMISSION (*through Hon. J. S. Whipple, Commissioner*), Albany, N. Y.:
Report, New York Forest, Fish and Game Commission.

PARKER, PROF. G. H., Harvard University, Cambridge, Mass.:
Pamphlets on Zoology.

SMITHSONIAN INSTITUTION, Washington, D. C.:
Reports and other Publications for 1908.

STATE GEOLOGIST, Chapel Hill, North Carolina.
Fishes of North Carolina, Smith; Oyster Culture in North Carolina.

TOWNSEND, C. H., New York City:
The Aquarium—H. D. Butler.

U. S. FISHERIES BUREAU (*through Hon. George M. Bowers, Commissioner*), Washington, D. C.:
Reports and other Publications for 1908.

WINGATE, HAROLD, Academy of Sciences, Philadelphia, Pa.:
Proceedings of Academy of Sciences.

Purchases

BIRLEM, MRS. FRED. A., Cranberry Isles, Maine:
Large Lobster.

KNOLL, LOUIS, & SON, New York City:
Turtles (6 specimens).

McDONALD, MRS. JANET, Bayville, Maine:
Harbor Seals (4 specimens).

MOWBRAY, L. L., Hamilton, Bermuda—Tropical Fishes from Bermuda:
1 Red Grouper, 42 Nassau Grouper, 16 Pig Fish, 2 Hogfish, 2 Spiny Lobster, 53 Hinds, 8 Princess Rock Fishes, 4 Common Rock Fishes, 2 Salmon Rock Fishes, 1 Tiger Rock Fish, 5 Cubbyu, 3 Locust Lobsters, 41 Striped Grunts, 32 Yellow Grunts, 1 White Grunt, 1 Butterfly Fish, 21 Trigger-fishes, 1 Queen Trigger-fish, 82 Four Eyes, 4 Yellow Tails, 5 Gray Snappers, 1 Spot Snapper, 10 Cow Fishes, 25 Trunk Fishes, 12 Spotted Morays, 1 large Green Moray, 2 small Green Morays, 71 Squirrel, 1 Porcupine, 136 Angel Fishes, 1 Iridio, 25 Coneys, 4 Octopus, 46 Surgeon Fishes, 4 Blue Tang, 3 Brown Parrots, 21 Green Parrot-fishes, 24 Mud Parrot-fishes, 9 Red-Finned Parrot-fishes, 5 Blue Parrot-fishes, 6 Parrot-fishes, 2 Lady Fishes, 1 Graysby, 9 Sergeant Majors, 1 Bream.

PISACANO, JOHN, New York City:
3 dozen Crayfishes.

SAUNDERS, CHARLES, New York City:
Hawkbill Turtle.

SMITH, WALTER T., New York City:
400-pound Green Turtle.

STANLEY, STEVE, New York City:
Horseshoe Crab.

STEAMER "ANGLER."—Collections from the "fishing banks" off the New Jersey Coast:
44 Prickly Skate, 12 Smooth Dogfish, 33 Horned Dogfish, 17 Sea Ravens, 9 Sea Robins, 62 Mutton Fish, 68 Sculpin, 34 Cunners, 114 Swell Fish, 55 Blackfish, 9 Anglers, 2 Fluke, 9 Barndoor Skate, 13 Codfish, 2 Trigger-fish, 12 Hake, 22 Whiting, 1 Yellow Sea Raven, 1 Conger Eel, 8 Sea Bass, 1 File Fish, 7 Bait Bugs, 2 Blue Crabs, 4 Starfish, 2 Lobster, 9 specimens Sea Plant, 2 pieces of Coral, 2 bunches Horse Mussels, 2 Lady Crabs.

TILYOU, GEORGE C., Coney Island, New York:
Sea Lions (2 specimens).

WILINSKI, J. J., Brooklyn, N. Y.:
Large Lobster.

WILSON, GEORGE C., Belmar, N. J.:
840-pound Leatherback Turtle.

WOOLLEY, JOHN, Ocean Grove, N. J.:
Porpoises (2 specimens).

Exchanges

DETROIT AQUARIUM, Detroit, Mich.:
1 Fresh-Water Sheepshead, 13 Whitefish, 10 Burbot, 7 Mudfish, 1 Crayfish, 6 Suckers, 1 Bullhead, 5 Long-Jawed Gar, 1 Short-Jawed Gar, 11 *Necturus*, 13 Rock Bass, 10 Pike Perch, 10 Quill-Back, 8 Sauger Pike, 6 Stone Rollers, 15 Red Horse Suckers, 1 Yellow Perch, 2 Short-Eared Sunfish, lot of young Gold Fishes.

TUXEDO CLUB, Tuxedo, New York:
14 Landlocked Salmon, 15 Steelhead Trout.

ROCKY MOUNTAIN GOAT IN 1909.
One of the males from the herd in the Zoological Park.

REPORT OF THE VETERINARIAN.

By W. REID BLAIR, D.V.S.

THE general health of the animals during the past year has been well maintained, and the death-rate kept well within what we must consider the normal for our collections. There have been the usual number of interesting medical and surgical cases among the animals during the year; and two cases of rheumatism, owing to their severity, are worthy of special mention.

Rheumatism.—The first case was that of the male African rhinoceros, which early in April was noticed to be in ill-health. He ceased to take any exercise and was found to be lying down a great deal of the time, and when urged to move would do so with slow, stiff and painful movements. The disease seemed to be localized in the joints; the knees and hocks being simultaneously attacked, and the suffering of the animal was intense. After a few days' illness he would lie constantly on his side, and when any attempt was made to disturb him he would groan with pain, and could gain his feet only with great effort. Under pressure, all the joints were very painful and much swollen. The skin over and surrounding the articulations was red, dry and hard; the mucous membranes of the nostrils and mouth congested, and the eyeballs greatly injected.

This animal was given salol in one dram doses, twice daily, for about a week, but without marked benefit. This drug was then discontinued, and salicylate of sodium substituted, with the result that the animal showed almost immediate relief from the beginning. Improvement continued for three weeks, when entire recovery had taken place.

While this was a very striking case, still we have had equally good results in other cases of rheumatism by the administration of this drug.

The Altai wapiti has had several attacks of rheumatism, usually coming on in late fall or early winter. Two years ago salol relieved this animal very promptly, but in the two last attacks it was apparently of no benefit, while gradual relief was afforded by the administration of the salicylate compounds. From our experience it appears that the secret of success with salicylate of sodium, and the salicylate compounds generally, lies in the speedy saturation of the system with the drug, rather than its moderate

and continuous administration. If the salicylate of sodium fails to relieve or give improvement after a few days' use, there is good reason to believe that the case is not one of genuine rheumatism.

Osteomalacia or Cage Paralysis.—Very few cases of this disease have occurred in the Primate collection during the past year, although several animals received as gifts were found to be in the secondary stages of the disease, and, being unfit for exhibition, were consequently destroyed.

Rickets.—While osteomalacia is a resoftening of the bones of mature animals in consequence of absorption of the lime salts, rickets, on the contrary, arises from the bones of young animals remaining soft owing to deficient calcification. Notwithstanding an extensive study of both these conditions, we are as yet unable to sufficiently clear up many of the puzzling characters, and determine definitely the relationship between the two diseases.

Rickets is seen among young lions, leopards, wolves, baboons, marmosets and other South American monkeys; and in many small mammals, as opossums, badgers and skunks.

Probably the chief cause of the disease as seen among wild animals, is the deficiency of lime and phosphorus in the food. The disease has recently been artificially produced in young dogs, pigs, goats and sheep, by continuously feeding them on food that was poor in lime salts, and these results are fully confirmed from clinical observation and practice. Finally, the fact that animals suffering from rickets are greatly improved or permanently cured by an increased supply of lime in the food, strengthens the theory that deficiency of lime is one of the chief causes of the disease.

The development of rickets is a slow process, requiring usually several months. While there does not seem to be an absolute constancy in the lesions, aside from the bone alterations, there is usually a period of ill-health and faulty nutrition before any changes in the bones can be recognized.

Among young lion cubs one of the first symptoms observed is an awkward, painful gait. The body sways from side to side in walking, and the animal is easily wearied, or found lacking in endurance. It lies down most of the time, and may even persistently refuse to get up and exercise. The ends of the bones enlarge near the joints, and the animal walks on the outside of the foot-pad, owing to partial flexion of the joints. Later on the long bones show signs of bowing; and this is seen principally in the radius and ulna. The back deviates from a straight line.

Either it is arched, with the dorsal vertebræ prominent, or the back may be depressed, giving a hollow or saddle-back appearance to the animal. Growth is greatly retarded, and often the animal remains dwarfed.

Rickets in monkeys is shown by great unthriftiness. The hair is dry, rough and faded, and the skin shows a predisposition to eczema. The back is arched and the bones prominent. There is swelling of the joints, particularly of the wrist, elbow and knee; the ends of the ribs are enlarged and the chest caved in. Bronchitis, indigestion and skin irritations appear, and, if not relieved, the animal continues in a state of malnutrition, and soon dies.

In the small mammals rickets is manifested by bony enlargements at the joints, and by button-like thickenings at the union of the ribs and costal cartilages; and curvature of the extremities with the hind legs flexed tightly under the body. The animals lie huddled up a great deal of the time, and when made to move do so with slow, painful movements.

Rickets may be mistaken for acute muscular rheumatism, but it must be remembered that rickets is a slow and gradually developing disease, while rheumatism comes on suddenly. In rheumatism there is no bulging and bending of the bones, and unless in the chronic form there are no enlargements at the joints.

In prevention and treatment alike, fresh air and dry quarters are absolutely necessary. Lime water, small doses of phosphate of soda or bone dust act beneficially as tonics as well as food material. For the carnivorous animals daily doses of cod-liver oil, given over a long period, is also of great value. Practically all cat animals will take this oil, smeared over meat, and in many cases will lap the clear oil from a pan with great relish. The other substances being practically tasteless no difficulty is experienced in administering them to any animal with the food.

Gastro-Enteritis.—The number of deaths from gastro-enteritis diminish each year, and during the past year no important large mammal died from this disease. In the buffalo herd, which has heretofore been the greatest sufferer from this disease, the only death to be recorded is that of a very old cow which had been a chronic sufferer from *gastro-enteritis* for the past five years. Among the animals on Mountain Sheep Hill there has been but few cases of *gastro-enteritis.* A number of acute cases developed during the late summer and early autumn, but by their prompt removal to the hospital, or Small-Deer House, for treatment they have all recovered. The male mouflon, which has had no less than five severe attacks of gastro-enteritis, has been kept in the Small-

Deer House during the past year, and is now in fine condition. The same is true of a number of other animals.

Pneumonia.—Fewer cases of pneumonia were seen during the past year than formally, although this was found as a frequent complication in animals suffering from distemper, tuberculosis or enteritis.

From our investigation of pneumonia, and clinical experience, we are convinced that a large number of the pneumonic cases which we meet with are due to a mixed infection, although the specific organisms have not been definitely determined. It would appear that the germs of pneumonia are not the same in all cases of the disease, and for all genera of animals. A spherical or oval coccus, arranged in pairs or short chains of four or more, as well as a short rod-shaped bacillus with rounded ends, occurring in pairs, are fairly constantly present. No animal inoculations with these organisms have been made to determine their degree of virulence.

Tuberculosis.—Outside the Primate collection no cases of tuberculosis have occurred during the past year. Our large chimpanzee "Soko," which had lived in the Park for about six years, died of generalized tuberculosis. Chimpanzee "August," another old inmate of the Primate House, died from acute tubercular pneumonia. This latter animal was a chronic sufferer from bronchitis, and on two occasions was seriously ill with broncho-pneumonia, but he rallied well in both instances and made good recoveries. Other cases of tuberculosis occurred in the smaller monkeys.

During the past year I have used the "Calmette Eyetest" for the detection of occult tuberculosis in monkeys. While as yet my observations have not been extensive, still it appears to be a most reliable method of detecting obscure cases of lymphatic tuberculosis. The test was applied to a chimpanzee which had just arrived, and the animal gave a typical reaction in six hours. It lived several weeks and on autopsy showed extensive lymphatic tuberculosis, the lungs being only moderately affected.

Since the lymphatic form of tuberculosis is the most difficult to detect, this method, if future results are as successful as we hope, will be of the greatest value to us in eliminating tuberculosis from our collections.

Distemper.—A few cases of this disease have occurred among the small mammals during the year, but with isolation of the infected animals and disinfection of the cages, the disease was promptly controlled. A pair of Australian wild dogs, recent arrivals from the National Zoological Park, contracted the dis-

ease. They were removed to the hospital cages, where one died, the other making a good recovery without nervous symptoms remaining.

Of all the diseases with which we have to contend, distemper is the most insidious, and the most fatal, and on account of the large number of species susceptible to this affection, every small mammal which arrives at the Park is viewed with suspicion for two weeks or more. Distemper is universally prevalent throughout the country, and is rarely absent for any length of time from the channels of transportation and animal exchanges, and to make the problem of control all the more difficult it is impossible to determine the medium through which the infection reaches our animals. For these reasons great precautions are necessary.

Bronchial Filaria and Rainey's Corpuscles.—It is now several years since either of these conditions have been found in the animals of the elk herd. The health of this collection has never been so satisfactory as at the present time. The same is true of the red deer and Asiatic deer herds.

Unusual Cause of Death.—An unusual cause of death was discovered in the female black leopard which died on September 19. At feeding time this animal and its cage mate quarreled over the pieces of meat which were thrown into the cage. The keeper reported that the male leopard fought for the meat which the female had in her mouth, chasing her through the passage to the outside cage, and he noticed that the male returned almost immediately with the meat in his mouth. After the keeper had fed the rest of the animals he took a piece of meat and proceeded to the outside cage to give it to the female leopard. Not finding her out there he investigated further, and finally found her in the sleeping box, dead.

The autopsy which followed showed the cause of death to be a piece of beef, five inches long and three-fourths of an inch thick, firmly lodged in the upper part of the windpipe and larynx, which the animal in her haste to swallow drew into the windpipe and was unable to dislodge, thereby causing asphyxiation.

Among the other unusual causes of deaths were the following: *Sarcomatous growth* attached to the spleen, weighing 8¾ pounds, in Eskimo dog "Bridge"; *Traumatic peritonitis* in an aoudad; *Pericarditis and cysticerci* in a Baker's roan antelope; *generalized infection with Cysticerci* in a chamois; *septic metritis* in a buffalo cow; and *toxic gastro-enteritis* in a guanaco.

Injuries.—There were a number of deaths as a result of unavoidable accidents, among them a young beatrix antelope, which suffered compound comminuted fractures of both fore legs and

had to be chloroformed. A young black-buck antelope broke its neck by rushing violently against the corral fence. A young buffalo heifer was gored to death by one of the other animals in the herd. There were a number of the smaller animals killed by cage mates.

As a part of my report I append a tabulated statement showing the causes of the deaths among the mammals of the Zoological Park during the past year.

LIST SHOWING CAUSES OF DEATH AMONG MAMMALS DURING 1908.

	Primates	Carnivores	Ungulates	Rodents	Marsupials	Edentates	Total
Pneumonia	4	5	2	7	1	1	20
Gastro-enteritis	4	3	3	2	1	2	15
Malnutrition and Atrophy	8	.....	1	1	.....	1	11
Killed by Cage Mates	3	2	2	3	.....	.....	10
Quarantine (died or destroyed)	6	1	.....	3	.....	.....	10
Tuberculosis	9	.....	.....	.....	.....	.....	9
Distemper	.....	6	.....	2	.....	.....	8
Rickets	3	.....	.....	.....	3	.....	6
Cage Paralysis	4	.....	.....	.....	.....	.....	4
Still-born	1	.....	4	.....	.....	.....	5
Parasitic Enteritis	2	.....	1	.....	.....	.....	3
Nephritis	1	1	.....	1	.....	.....	3
Hepatitis and Jaundice	1	1	.....	.....	.....	.....	2
Degeneration and Dilation of Heart	.....	1	.....	.....	.....	.....	1
Pericarditis and Myocarditis	.....	.....	1	.....	.....	.....	1
Intestinal Obstruction	.....	.....	.....	1	.....	.....	1
Tapeworm Cysts	.....	.....	1	.....	.....	.....	1
Strangulation	.....	1	.....	.....	.....	.....	1
Fungus Poisoning	.....	.....	1	.....	.....	.....	1
Septic Metritis	.....	.....	1	.....	.....	.....	1
Unclassified	.....	.....	.....	2	.....	.....	2
No Lesions to account for death	2	1	.....	4	1	.....	8
Total	48	22	17	26	6	4	123

Respectfully submitted,

W. Reid Blair, D.V.S.,

Veterinarian.

LIST OF BIRDS NOW OR LATELY LIVING IN THE NEW YORK ZOOLOGICAL PARK,

January, 1909.

Class AVES, Birds.

Order **RHEIFORMES**, Rhea-like Birds.

Family RHEIDAE, Rheas.

Common Rhea .....*Rhea americana* (Linn.).
White Rhea .....*Rhea americana* (Linn.) var.
Great-billed Rhea .....*Rhea macrorhyncha* Scl.

Order **STRUTHIONIFORMES**, Ostrich-like Birds.

Family STRUTHIONIDAE, Ostriches.

North African Ostrich ....*Struthio camelus* Linn.
Somali-land Ostrich .....*Struthio molybdophanes* Reichen.
South African Ostrich ....*Struthio australis* Gurney.

Order **CASUARIIFORMES**, Cassowary-like Birds.

Family DROMAEIDAE, Emeus.

Emeu .....*Dromaeus novae-hollandiae* Lath.

Family CASUARIIDAE, Cassowaries.

Ceram Cassowary .....*Casuarius casuarius* (Linn.).
Violet-necked Cassowary ..*Casuarius viollicollis* Rothsc.
One-wattled Cassowary ...*Casuarius uniappendiculatus* Blyth.
Bennett Cassowary .....*Casuarius bennetti* Gould.

Order **TINAMIFORMES**, Tinamou-like Birds.

Family TINAMIDAE, Tinamous.

Rufous Tinamou .....*Rhynchotus rufescens* (Temm.).
Crested Tinamou .....*Calopezus elegans* (D'Orb. & Geoffr.).

Order **GALLIFORMES**, Fowl-like Birds.

Sub-Order **Megapodii.**

Family MEGAPODIIDAE, Brush Turkeys.

Brush Turkey .....*Catheturus lathami* (Lath.).

Sub-Order **Craces.**

Family CRACIDAE, Curassows and Guans.

Crested Curassow .....*Crax alector* Linn.
Banded Curassow .....*Crax fasciolata* Spix.
Globose Curassow .....*Crax globicera* Linn.
Panama Curassow .....*Crax panamensis* Grant.
Venezuelan Curassow .....*Crax daubentoni* Gray.
Razor-billed Curassow ....*Mitua mitu* (Linn.).
Lesser Razor-billed
Curassow .....*Mitua tomentosa* (Spix.).
Purplish Guan .....*Penelope purpurascens* Wagl.
Crested Guan .....*Penelope cristata* (Linn.).
Bolivian Guan .....*Penelope boliviana* Bonap.
Red-tailed Chachalaca ....*Ortalis ruficauda* (Jard.).
White-breasted Chachalaca.*Ortalis albiventris* (Wagl.).
Northern Chachalaca .....*Ortalis vetula maccalli* Baird.
Chattering Chachalaca ....*Ortalis garrula* (Humb.).

Sub-Order **Phasiani.**

Family TETRAONIDAE, Ptarmigan and Grouse.

Willow Ptarmigan .....*Lagopus lagopus* (Linn.).
White-tailed Ptarmigan ...*Lagopus leucurus* (Swains & Rich.).
Black-cock .....*Lyrurus tetrix* (Linn.).
Capercaille .....*Tetrao urogallus* Linn.
Prairie Hen .....*Tympanuchus americanus* (Reich.).
Ruffed Grouse .....*Bonasa umbellus* (Linn.).

Family PHASIANIDAE, Partridges, Pheasants, and Peacocks.

Chukar Red-legged
Partridge .....*Caccabis chukar* Gray.
Painted Francolin .....*Francolinus pictus* (J. & S.).
Gray Francolin .....*Francolinus pondicerianus* (Gmel.).
Vermiculated Francolin ...*Pternistes cranchi* (Leach).
Abyssinian Francolin .....*Pternistes infuscatus* Cab.

European Partridge .....*Perdix perdix* (Linn.).
European Quail .....*Coturnix coturnix* (Linn.).
Rain Quail .....*Coturnix coromandelica* (Gmel.).
Chinese Painted Quail ....*Excalfactoria chinensis* (Linn.).
Satyra Crimson-horned
Tragopan .....*Tragopan satyra* (Linn.).
Temminck Horned
Tragopan .....*Tragopan temminckii* (J. E. Gray).
Cabot Tragopan .....*Tragopan caboti* (Gould).
Impeyan Moonal Pheasant.*Lophophorus impeyanus* Lath.
Siamese Fire-backed
Pheasant .....*Diardigallus diardi* Bonap.
Manchurian Eared
Pheasant .....*Crossoptilum manchuricum* Swinh.
Black-crested Nepal
Pheasant .....*Gennaeus leucomelanus* (Lath.).
Melanotus Pheasant .....*Gennaeus melanonotus* (Blyth).
Anderson Pheasant .....*Gennaeus andersoni* (Elliot).
Lineated Pheasant .....*Gennaeus lineatus* (Vig.).
Silver Pheasant .....*Gennaeus nycthemerus* (Linn.).
Swinhoe Pheasant .....*Gennaeus swinhoei* Gould.
English Pheasant .....*Phasianus colchicus* Linn.
White Pheasant .....*Phasianus colchicus* Linn. var.
Ring-necked Pheasant ....*Phasianus torquatus* Gmel.
English Ring-necked
Pheasant .....*Phasianus colchicus+torquatus.*
Satschen Ring-necked
Pheasant .....*Phasianus satscheunensis* Przev.
Versicolor Pheasant .....*Phasianus versicolor* Vieill.
Soemmering Pheasant .....*Phasianus soemmerringii* Temm.
Reeves Pheasant .....*Syrmaticus reevesi* Gray.
Elliot Pheasant .....*Calophasis ellioti* (Swinh.).
Golden Pheasant .....*Chrysolophus pictus* (Linn.).
Amherst Pheasant .....*Chrysolophus amherstiae* Leadb.
Red Jungle Fowl .....*Gallus gallus* (Linn.).
Polish Fowl .....*Gallus domesticus.*
Peacock Pheasant .....*Polyplectrum germaini* Elliot.
Indian Peacock .....*Pavo cristatus* Linn.
White Indian Peacock ....*Pavo cristatus* Linn. var.
Black-winged Peacock ....*Pavo nigripennis* Scl.
Javan Peacock .....*Pavo muticus* Linn.

Family NUMIDIDAE, Guinea Fowl.

Wild Guinea Fowl .....*Numida meleagris* Linn.
Abyssinian Guinea Fowl ...*Numida ptilorhyncha* Licht.
Vulturine Guinea Fowl ....*Acryllium vulturium* (Hardw.).

Family MELEAGRIDAE, Turkeys.

Wild Turkey .....*Meleagris gallopavo silvestris* (Vieill.).

Family ODONTOPHORIDAE, New World Quail.

Gray-headed Tree-partridge .....*Dendrortyx barbatus* Licht.
Scaled Quail .....*Callipepla squamata* (Vig.).
Plumed Quail .....*Oreortyx pictus plumiferus* (Gould).
California Quail .....*Lophortyx californicus* (Shaw).
Gambel Quail .....*Lophortyx gambelii* (Gambel).
Douglas Quail .....*Lophortyx douglasi* (Doug.).
Curacao Crested Quail.....*Eupsychortyx cristatus* (Linn.).
Bob-white .....*Colinus virginianus virginianus* (Linn.).
Jamaica Bob-white .....*Colinus virginianus* (Linn.) var.
Texan Bob-white .....*Colinus virginianus texanus* (Lawr.).
Florida Bob-white .....*Colinus floridanus* Coues.
Cuban Bob-white .....*Colinus cubanensis* Gould.
Montezuma Quail .....*Cyrtonyx montezumae* (Vig.).

Order **COLUMBIFORMES**, Pigeons and Doves.

Family TRERONIDAE, Fruit Pigeons.

Banded Fruit Pigeon .....*Ptilopus fasciatus* Peale.

Family COLUMBIDAE, the Rock Dove and others.

Rock Dove .....*Columba livia* Bonn.
Pouter Pigeon .....*Columba livia* Bonn. var.
Fan-tailed Pigeon .....*Columba livia* Bonn. var.
Jacobin Pigeon .....*Columba livia* Bonn. var.
Curacao Dove .....*Columba gymnophthalma* Temm.
Spotted Pigeon .....*Columba arquatrix* Temm.
White-crowned Pigeon ....*Columba leucocephala* Linn.
Caribbean Dove .....*Columba caribaea* Linn.
Band-tailed Pigeon .....*Columba fasciata* Say.

Family PERISTERIDAE, Turtle and Ground Doves.

Mourning Dove .....*Zenaidura macroura carolinensis* (Linn.).
Pea Dove .....*Zenaida zenaida* (Bonap.).
Venezuela Dove .....*Zenaida vinaceo-rufa* Ridgw.
White-winged Dove .....*Melopelia asiatica* (Linn.).
European Turtle Dove ....*Turtur turtur* (Linn.).
Oriental Turtle Dove .....*Turtur orientalis* (Lath.).
Barbary Turtle Dove ....*Streptopelia risoria* (Linn.).
Half-collared Turtle Dove.*Streptopelia semitorquata* (Rupp.).
Changeable Turtle Dove...*Streptopelia ambigua* (Boc.).
Cape Turtle Dove .....*Streptopelia capicola* (Finsch.).
Vinaceous Turtle Dove....*Streptopelia vinacea* (Gmel.).
Chinese Turtle Dove .....*Spilopelia chinensis* (Scop.).
Senegal Turtle Dove .....*Stigmatopelia senegalensis* (Linn.).
Barred Dove .....*Geopelia striata* (Linn.).
Mauge Dove .....*Geopelia maugaei* (Temm.).
Graceful Ground Dove....*Geopelia cuneata* (Lath.).
Scaly Dove .....*Scardafella squamosa* (Temm. & Knip.).
Inca Dove .....*Scardafella inca* (Less.).
Common Ground Dove ....*Columbigallina passerina terrestris* Chapm.
Mexican Ground Dove ....*Columbigallina passerina pallescens* (Baird).
Bahama Ground Dove .....*Columbigallina bahamensis* Maynard.
Pygmy Ground Dove.....*Columbigallina minuta* (Linn.).
Long-tailed Namaqua Dove *Oena capensis* (Linn.).
Bronze-spotted Dove .....*Chalcopelia afra* (Linn.).
Green-winged Dove .....*Chalcophaps indica* (Linn.).
Plumed Quail-Dove .....*Lophophaps leucogaster* Gould.
Australian Crested Pigeon..*Ocyphaps lophotes* (Temm.).
Red-underwing Dove .....*Leptoptila rufaxilla* (Rich.).
White-breasted Dove .....*Leptoptila jamaicensis* (Linn.).
Ruddy Quail-Dove .....*Geotrygon montana* (Linn.).
Key West Quail Dove .....*Geotrygon chrysia* Bonap.
Bleeding-heart Pigeon ....*Phlogonas luzonica* (Scop.).
Wonga-wonga Pigeon .....*Leucosarcia picata* (Lath.).
Blue-headed Quail-Dove ..*Starnoenas cyanocephala* (Linn.).
Nicobar Pigeon .....*Caloenas nicobarica* (Linn.).

Family GOURIDAE, Crowned Pigeons.

Great Crowned Pigeon ....*Goura coronata* (Linn.).
Victoria Crowned Pigeon..*Goura victoria* (Fraser).

Order **RALLIFORMES**, Rails, Gallinules, and Coots.

Family RALLIDAE, Rails, Gallinules, and Coots.

Clapper Rail .....*Rallus crepitans* Gmel.
Virginia Rail .....*Rallus virginianus* Linn.
Cayenne Wood-Rail .....*Aramides cayanea* (Müll.).
Ypacaha Rail .....*Aramides ypacaha* (Vieill.).
Weka Rail .....*Ocydromus australis* (Sparrm.).
Sora or Carolina Rail.....*Porzana carolina* (Linn.).
Little Black Gallinule.....*Limnocorax niger* (Gmel.).
Florida Gallinule .....*Gallinula galeata* Bonap.
Purple Gallinule .....*Ionornis martinica* (Linn.).
Sultana Gallinule .....*Porphyrio porphyrio* (Linn.).
Gray-headed Gallinule ....*Porphyrio poliocephalus* (Lath.).
Black-backed Gallinule ....*Porphyrio melanonotus* Temm.
American Coot .....*Fulica americana* Gmel.

Order **PODICIPEDIDIFORMES**, Grebes.

Family PODICIPIDAE, Grebes.

Horned Grebe .....*Dytes auritus* (Linn.).
Holboell Grebe .....*Lophaethyia holboelli* (Reinh.).
Pied-billed Grebe .....*Podilymbus podiceps* (Linn.).

Order **COLYMBIFORMES**, Loons.

Family COLYMBIDAE, Loons.

American Great Northern
Loon .....*Gavia immer* (Brün.).

Order **SPHENISCIFORMES**, Penguins.

Family SPHENISCIDAE, Penguins.

Black-footed Penguin .....*Spheniscus demersus* (Linn.).

Order **PROCELLARIIFORMES**, Petrels, Fulmars, and Albatrosses.

Family PROCELLARIIDAE, Petrels.

Wilson Petrel .....*Oceanites oceanicus* (Kuhl.).

Order **ALCIFORMES**, Auks, Murres, and Puffins.

Family ALCIDAE, Auks, Murres, and Puffins.

Dovekie or Little Auk.....*Alle alle* (Linn.).
Brünnich Murre .....*Uria lomvia* (Linn.).

Order **LARIFORMES**, Terns, Skimmers, and Gulls.

Family LARIDAE, Terns, Skimmers, and Gulls.

Common Tern .....*Sterna hirundo* Linn.
Sooty Tern .....*Sterna fuliginosa* Gmel.
Least Tern .....*Sterna antillarum* (Less.).
Black Skimmer .....*Rhynchops nigra* Linn.
Franklin Gull .....*Larus franklinii* (Swain & Rich.).
Laughing Gull .....*Larus atricilla* Linn.
Brown-headed Gull .....*Larus ridibundus* Linn.
Great Black-backed Gull ..*Larus marinus* Linn.
Western Gull .....*Larus occidentalis* Aud.
Herring Gull .....*Larus argentatus* Brunn.
Ring-billed Gull .. ..*Larus delawarensis* Ord.
Glaucous Gull .....*Larus hyperboreus* Gunn.
Ivory Gull .....*Pagophila alba* (Gunn.).
Kittiwake Gull .....*Rissa tridactyla* (Linn.).

Order **CHARADRIIFORMES**, Plovers, Sandpipers, Thicknees and Bustards.

Sub-Order **Charadrii**.

Family CHARADRIIDAE, Plovers, and Sandpipers.

Patagonian Lapwing .....*Belonopterus chilensis* (Mol.).
European Lapwing .....*Vanellus vanellus* (Linn.).
Killdeer .....*Oxyechus vociferus* (Linn.).
Black-necked Stilt .....*Himantopus mexicanus* (Müll.).
European Avocet .....*Recurvirostra avocetta* Linn.
European Curlew .....*Numenius arquata* (Linn.).

Whimbrel .....*Numenius phaeopus* (Linn.).
Dowitcher .....*Macrorhamphus griseus* (Gmel.).
Willet .....*Catoptrophorus semipalmatus* (Gmel.).
Redshanks .....*Totanus calidris* (Linn.).
Yellow-legs .....*Totanus flavipes* (Gmel.).
Spotted Sandpiper .....*Actitis macularia* (Linn.)
Ruff .....*Pavoncella pugnax* (Linn.).
Bartramian Sandpiper ....*Bartramia longicauda* (Bechst.).
Semipalmated Sandpiper...*Ereunetes pusillus* (Linn.).
Sanderling .....*Calidris leucophaea* (Pall.).
Knot .....*Tringa canutus* (Linn.).
Wilson Snipe .....*Gallinago delicata* (Ord.).
American Woodcock .....*Philohela minor* (Gmel.).

Sub-Order **Oedicnemi.**

Family OEDICNEMIDAE, Thicknees.

Double-striped Thicknee ..*Oedicnemus bistriatus* (Wagl.).

Order **GRUIFORMES,** Cranes, Seriemas, etc.

Sub-Order **Grues.**

Family GRUIDAE, Cranes.

Sandhill Crane .....*Grus mexicana* (Müll.).
Little Brown Crane .....*Grus canadensis* (Linn.).
Whooping Crane .....*Grus americana* (Linn.).
Asiatic White Crane .....*Sarcogeranus leucogeranus* (Pall.).
Sarus Crane .....*Antigone antigone* (Linn.).
Paradise Crane .....*Tetrapteryx paradisea* (Licht.).
Demoiselle Crane .....*Anthropoides virgo* (Linn.).
Crowned Crane .....*Balearica pavonina* (Linn.).

Sub-Order **Arami.**

Family ARAMIDAE, Limpkins.

Limpkin or Courlan .....*Aramus vociferus* (Lath.).

Sub-Order **Eurypygae.**

Family EURYPYGIDAE, Sun-bitterns.

Sun-bittern .....*Eurypyga helias* (Pall.).

Sub-Order **Psophiae.**

Family PSOPHIIDAE, Trumpeters.

Common Trumpeter .....*Psophia crepitans* Linn.

Sub-Order **Dicholophi.**

Family CARIAMIDAE, Seriemas.

Seriema .....*Cariama cristata* Linn.

Order **ARDEIFORMES,** Ibises, Storks, and Herons.

Sub-Order **Plataleae.**

Family IBIDIDAE, Ibises.

Glossy Ibis .....*Plegadis autumnalis* (Hasselq.).
White-faced Glossy Ibis...*Plegadis guarauna* (Linn.).
White Ibis .....*Guara alba* (Linn.).
Scarlet Ibis .....*Guara rubra* (Linn.).

Family PLATALEIDAE, Spoonbills.

Roseate Spoonbill .....*Ajaia ajaia* (Linn.).

Sub-Order **Ciconiae.**

Family CICONIIDAE, Storks and Adjutants.

Wood Ibis .....*Mycteria americana* Linn.
Indian Wood Ibis .....*Pseudotantalus leucocephalus* (Gmel.).
White Stork .....*Ciconia ciconia* (Linn.).
Black Stork .....*Ciconia nigra* (Linn.).
Black-necked Stork .....*Xenorhynchus asiaticus* (Lath.).
Jabiru .....*Jabiru mycteria* (Licht.).
Indian Adjutant .....*Leptoptilus dubius* (Gmel.).
Javan Adjutant .....*Leptoptilus javanicus* (Horsf.).
Marabou Stork .....*Leptoptilus crumeniferus* (Less.).

Sub-Order **Ardeae.**

Family ARDEIDAE, Herons and Bitterns.

European Blue Heron ....*Ardea cinerea* Linn.
Great Blue Heron .....*Ardea herodias herodias* Linn.
Ward Heron .....*Ardea herodias wardi* Ridgw.
Great White Heron .....*Ardea occidentalis* Ord.
American Egret .....*Herodias egretta* (Gmel.).

Little Blue Heron .....*Florida caerulea* (Linn.).
Reddish Egret .....*Dichromanassa rufescens* (Gmel.).
Snowy Egret .....*Egretta candidissima* (Gmel.).
Louisiana Heron .....*Hydranassa tricolor ruficollis* (Gosse).
Yellow-crowned Night Heron .....*Nyctanassa violacea* (Linn.).
Black-crowned Night Heron .....*Nycticorax nycticorax naevius* (Bodd.).
European Night Heron ....*Nycticorax nycticorax* (Linn.).
Green Heron .....*Butorides virescens* (Linn.).
Amazonian Tiger Bittern ..*Tigrisoma lineatum* (Bodd.).
Tiger Bittern .....*Heterocnus cabanisi* (Heine).
Least Bittern .....*Ixobrychus exilis* (Gmel.).
American Bittern .....*Botaurus lentiginosus* (Montag.).

Order **PALAMEDEIFORMES**, Screamer.

Sub-Order **Palamedeae.**

Family PALAMEDIDAE, Screamers.
Crested Screamer .....*Chauna cristata* (Swains.).

Order **PHOENICOPTERIFORMES**, Flamingos.

Family PHOENICOPTERIDAE, Flamingos.
American Flamingo .....*Phoenicopterus ruber* Linn.
European Flamingo .....*Phoenicopterus roseus* Pall.

Order **ANSERIFORMES**, Swans, Geese, and Ducks.

Family ANATIDAE, Swans, Geese, and Ducks.
Whooping Swan .....*Cygnus cygnus* (Linn.).
Bewick Swan .....*Cygnus bewicki* Yarr.
Whistling Swan .....*Cygnus columbianus* (Ord.).
Trumpeter Swan .....*Cygnus buccinator* Richards.
Mute Swan .....*Cygnus olor* Gmel.
Black-necked Swan .....*Cygnus melanocoryphus* (Mol.).
Black Swan .....*Chenopsis atrata* (Lath.).
Semipalmated Goose .....*Anseranus semipalmata* (Lath.).
Spur-winged Goose .....*Plectropterus gambensis* (Linn.).

Muscovy Duck .....*Cairina moschata* (Linn.).
Wood Duck .....*Aix sponsa* (Linn.).
Mandarin Duck .....*Aix galericulata* (Linn.).
Coscoroba Goose .....*Coscoroba coscoroba* (Mol.).
Snow Goose .....*Chen hyperborea* (Pall.).
Greater Snow Goose .....*Chen hyperborea nivalis* (Forst.).
Wild Gray Goose .....*Anser anser* (Linn.).
White-fronted Goose .....*Anser albifrons* (Gmel.).
Bean Goose .....*Anser fabilis* Lath.
Pink-footed Goose .....*Anser brachyrhynchus* (Baill.).
Bar-headed Goose .....*Eulabia indica* (Lath.).
Chinese Goose .....*Cygnopsis cygnoides* (Linn.).
Canada Goose .....*Branta canadensis* Linn.
Hutchin Goose .....*Branta canadensis hutchinsii* (Richards).
Barnacle Goose .....*Branta leucopsis* (Bechst.).
Brant Goose .....*Branta bernicla* (Linn.).
Upland Goose .....*Chloëphaga magellanica* (Gmel.).
White-faced Tree-duck ....*Dendrocygna viduata* (Linn.).
Fulvous Tree-duck .....*Dendrocygna fulva* (Gmel.).
Australian Tree-duck .....*Dendrocygna arcuata* (Horsf.).
Java Tree-duck .....*Dendrocygna javanica* (Horsf.).
Black-bellied Tree-duck ..*Dendrocygna autumnalis* (Linn.).
Bahama Tree-duck .....*Dendrocygna arborea* (Linn.).
Egyptian Goose .....*Alopochen aegyptiacus* (Linn.).
Tadorna Sheldrake .....*Tadorna tadorna* (Linn.).
Ruddy Sheldrake .....*Casarca casarca* (Linn.).
Australian Sheldrake .....*Casarca tadornoides* (J. & S.).
Mallard Duck .....*Anas platyrhynchos* Linn.
Smaragd Duck .....*Anas platyrhynchos* Linn. var.
Black Duck .....*Anas obscuras* Gmel.
Australian Gray Duck ....*Anas superciliosa* Gmel.
Gadwall Duck .....*Chaulelasmus strepera* Linn.
European Widgeon .....*Mareca penelope* (Linn.).
Baldpate .....*Mareca americana* (Gmel.).
European Green-winged Teal .....*Nettion crecca* (Linn.).
American Green-winged Teal .....*Nettion carolinensis* (Gmel.).
Pintail Duck .....*Dafila acuta* (Linn.).

Garganey Teal .....*Querquedula querquedula* (Linn.).
Blue-winged Teal .....*Querquedula discors* (Linn.).
Cinnamon Teal .....*Querquedula cyanoptera* Vieill.
Shoveller Duck .....*Spatula clypeata* (Linn.).
Rosy-billed Duck .....*Metopiana peposaca* (Vieill.).
Pochard Duck .....*Aythya ferina* (Linn.).
Red-head Duck .....*Aythya americana* (Eyt.).
Canvas-back Duck .....*Aythya vallisneria* (Wils.).
Scaup Duck .....*Marila marila* (Linn.).
Lesser Scaup Duck .....*Marila affinis* (Eyt.).
Tufted Scaup Duck .....*Marila fuligula* (Linn.).
American Golden-eye Duck.*Clangula clangula americana* Fax.
European Eider Duck ....*Somateria mollissima* (Linn.).
Ruddy Duck .....*Erismatura jamaicensis* (Gmel.).
American Merganser .....*Mergus americanus* Cass.
Red-breasted Merganser...*Mergus serrator* Linn.

Order **PELECANIFORMES**, Cormorants, Pelicans, etc.

Family Phalacrocoracidae, Cormorants.

Double-crested Cormorant..*Phalacrocorax dilophus* (Swains.).
Florida Cormorant .....*Phalacrocorax dilophus floridanus* (Ord.).

Family Anhingidae, Snake-birds.

Snake-bird .....*Anhinga anhinga* (Linn.).

Family Sulidae, Gannets and Boobies.

Gannet .....*Sula bassana* (Linn.).
Booby or Brown Gannet...*Sula leucogastra* (Bodd.).

Family Fregatidae, Frigate Birds.

Frigate Bird .....*Fregata aquila* Linn.

Family Phaethonidae, Tropic-birds.

Yellow-billed Tropic-bird..*Phaëthon americanus* Grant

Family Pelecanidae, Pelicans.

European White Pelican ...*Pelecanus onocrotalus* Gmel.
Red-backed Pelican .....*Pelecanus rufescens* Gmel.
Brown Pelican .....*Pelecanus occidentalis* Linn.
American White Pelican ..*Pelecanus erythrorhynchus* Gmel.
Black-backed Pelican .....*Pelecanus conspicillatus* Temm.

Order **CATHARTIDIFORMES**, American Condors and Vultures.

Family CATHARTIDAE.

Condor .....*Sarcorhamphus gryphus* (Linn.).
King Vulture .....*Gypagus papa* (Linn.).
Black Vulture .....*Catharista urubu* (Vieill.).
Turkey Vulture .....*Cathartes aura septentrionalis* (Wild).
California Condor .....*Gymnogyps californianus* (Shaw).

Order **ACCIPITRIFORMES**, Hawks, Eagles, and Old World Vultures.

Sub-Order **Accipitres.**

Family VULTURIDAE, Old World Vultures.

Griffon Vulture .....*Gyps fulvus* (Gmel.).
Kolbe Vulture .....*Gyps kolbi* (Daud.).

Family FALCONIDAE, Hawks and Eagles.

Caracara .....*Polyborus cheriway* (Jacq.).
Marsh Hawk .....*Circus hudsonius* (Linn.).
Harris Hawk .....*Parabuteo unicinctus harrisi* (Aud.).
Sharp-shinned Hawk .....*Accipiter velox* (Wils.).
Cooper Hawk .....*Accipiter cooperii* (Bonap.).
Sennett White-tailed Hawk.*Buteo albicaudatus sennetti* Allen.
European Buzzard .....*Buteo buteo* (Linn.).
Red-tailed Hawk .....*Buteo borealis* (Gmel.).
Red-shouldered Hawk ....*Buteo lineatus* (Gmel.).
Broad-winged Hawk .....*Buteo platypterus* (Vieill.).
Lammergeyer or Bearded Vulture .....*Gypaëtus barbatus* (Linn.).
Australian Wedge-tailed Eagle .....*Uroaëtus audax* (Lath.).
Golden Eagle .....*Aquila chrysaetos* (Linn.).
Rough-legged Hawk .....*Archibuteo lagopus sancti-johannis* (Gmel.).
Ferruginous Rough-legged Hawk .....*Archibuteo ferrugineous* (Licht.).
Tyrant Eagle .....*Spizaëtus tyrannus* (Neuwied.).
Bateleur Eagle .....*Helotarsus ecaudatus* (Daud.).

White-tailed Sea Eagle....*Haliaëtus albicilla* (Linn.).
Bald Eagle .....*Haliaëtus leucocephalus* (Linn.).
White-breasted Sea Eagle . .*Haliaëtus leucogaster* (Gmel.).
Vulturine Sea Eagle .....*Gypohierax angolensis* (Gmel.).
European Red Kite .....*Milvus milvus* (Linn.).
English Peregrine Falcon..*Falco peregrinus peregrinus* Tunst.
American Duck Hawk ....*Falco peregrinus anatum* (Bonap.).
Hobby Falcon .....*Falco subbuteo* Linn.
Aplomado Falcon .....*Falco fusco-coerulescens* Vieill.
Pigeon Hawk .....*Falco columbarius* Linn.
White Gyrfalcon .....*Falco islandus* Brunn.
Kestrel .....*Falco tinnunculus* Linn.
South African Kestrel ....*Falco rupicola* (Daud.).
American Sparrow Hawk..*Falco sparverius sparverius* Linn.
Desert Sparrow Hawk ....*Falco sparverius phaloena* (Less.).
Cuban Sparrow Hawk ....*Falco sparverioides* Vig.
Short-winged Sparrow
Hawk .....*Falco brevipennis* Berl.

Sub-Order **Pandiones.**

Family PANDIONIDAE, Ospreys or Fish Hawks.
American Osprey .....*Pandion haliaëtus carolinensis* (Gmel.).

Order **STRIGIFORMES,** Owls.

Family STRIGIDAE, Horned Owls and others.

American Long-eared Owl..*Asio wilsonianus* (Less.).
Short-eared Owl .....*Asio flammeus* (Pont.).
Giant Eagle Owl .....*Bubo bubo* (Linn.).
Great Horned Owl .....*Bubo virginianus virginianus* (Gmel.).
Western Horned Owl .....*Bubo virginianus pallescens* Stone.
Dusky Horned Owl .....*Bubo virginianus saturatus* Ridgw.
Cape Eagle Owl .....*Bubo capensis* Smith.
Snowy Owl .....*Nyctea nyctea* (Linn.).
Spectacle Owl .....*Pusaltrix perspicillata* (Lath.).
Little Scops Owl .....*Scops scops* (Linn.).
Screech Owl .....*Otus asio asio* (Linn.).
Mexican Screech Owl.....*Otus asio cineraceus* (Ridgw.).

Tawny Owl .....*Syrnium aluco* (Linn.).
Barred Owl .....*Strix varium varium* (Barton).
Florida Barred Owl .....*Strix varium alleni* (Ridgw.).
Saw-whet Owl .....*Glaux acadicus* (Gmel.).
European Little Owl .....*Athene noctua* (Scop.).
Western Burrowing Owl...*Speotyto cunicularia hypogaea* (Bonap.).
Florida Burrowing Owl....*Speotyto cunicularia floridana* Ridgw.
Cuban Pygmy Owl .....*Glaucidium siju* (D'Orb.).

Family ALUCONIDAE, Barn Owls.

South African Barn Owl...*Aluco flammea* (Linn.).
American Barn Owl .....*Aluco pratincola* Bonap.
Cape Grass Owl .....*Aluco capensis* Smith.

Order **PSITTACIFORMES**, Parrots, Macaws, Cockatoos, and Lories.

Family LORIIDAE, Lories.

Scarlet Chattering Lory ...*Lorius garrulus* (Linn.).
Blue Mountain Lorikeet ...*Trichoglossus novae-hollandiae* (Gmel.).

Family CACATUIDAE, Cockatoos.

Gang-gang Cockatoo .....*Callocephalum galeatum* (Lath.).
Sulphur-crested Cockatoo..*Cacatua galerita* (Lath.).
Lesser Sulphur-crested Cockatoo .....*Cacatua sulphurea* (Gmel.).
Leadbeater Cockatoo .....*Cacatua leadbeateri* (Vig.).
Great White Cockatoo ....*Cacatua alba* (Müll.).
Red-crested Cockatoo .....*Cacatua moluccensis* (Gmel.).
Bare-eyed Cockatoo .....*Cacatua gymnopsis* Scl.
Roseate Cockatoo .....*Cacatua roseicapillus* Vieill.
Western Slender-billed Cockatoo .....*Licmetis pastinator* Gould.
Cockateel .....*Calopsittacus novae-hollandiae* (Gmel.).

Family PSITTACIDAE, Macaws, Parrots, and Parrakeets.

Hyacinthine Macaw .....*Anodorhynchus hyacinthinus* (Lath.)
Blue-and-Yellow Macaw ..*Ara ararauna* (Linn.).
Red-and-Blue Macaw ....*Ara macao* (Linn.).

Green-winged Macaw .....*Ara chloroptera* Gray.
Military Macaw .....*Ara militaris* (Linn.).
Great Green Macaw .....*Ara ambigua* (Bechst.).
Austere Macaw .....*Ara severa* (Linn.).
Illiger Macaw .....*Ara maracana* (Vieill.).
Macavuanna Macaw .....*Ara macavuanna* (Gmel.).
Blue-crowned Conure ....*Conurus haemorrhous* (Spix.).
Yellow-headed Parrakeet..*Conurus jendaya* (Gmel.).
Long-tailed Green Parrakeet .....*Conurus euops* (Wagl.).
Brown-throated Parrakeet..*Conurus aeruginosus* (Linn.).
Yellow-faced Parrakeet ...*Conurus pertinax* (Linn.).
Golden-crowned Parrakeet.*Conurus aureus* (Gmel.).
White-eared Parrakeet ....*Pyrrhura leucotis* (Kuhl.).
Gray-breasted Parrakeet ..*Myosittacus monachus* (Bodd.).
Barred Parrakeet .....*Bolborhynchus lineolatus* (Cass.).
Pigmy Parrotlet .....*Psittacula spengeli* Hartl.
Canary-winged Parrakeet..*Brotogerys chiriri* (Vieill.).
White-winged Parrakeet ..*Brotogerys virescens* (Gmel.).
Orange-winged Parrakeet..*Brotogerys pyrrhopterus* (Lath.).
Tovi Parrakeet .....*Brotogerys jugularis* (Müll.).
Mealy Amazon .....*Amazona farinosa* (Bodd.).
Orange-winged Amazon ...*Amazona amazonica* (Linn.).
Blue-fronted Amazon .....*Amazona aestiva* (Linn.).
Yellow-shouldered Amazon.*Amazona ochroptera* (Gmel.).
Yellow-fronted Amazon....*Amazona ochrocephala* (Gmel.).
Golden-naped Amazon ....*Amazona auripalliata* (Less.).
Yellow-headed Amazon ...*Amazona oratrix* Ridgw.
Green-cheeked Amazon ...*Amazona viridigena* Cass.
Yellow-cheeked Amazon ..*Amazona autumnalis* (Linn.).
Festive Amazon .....*Amazona festiva* (Linn.).
Red-faced Amazon .....*Amazona albifrons* (Sparrm.).
Dominican Amazon .....*Amazona ventralis* (Müll.).
White-fronted Amazon ...*Amazona leucocephala* (Linn.).
Cayman Island Amazon ...*Amazona caymanensis* Cory.
Bahama Amazon .....*Amazona bahamensis* (Bryant).
Blue-headed Parrot .....*Pionus menstruus* (Linn.).
Black-headed Caique .....*Pionites melanocephalus* (Linn.).
Yellow-bellied Senegal Parrot .....*Poeocephalus senegalus* (Linn.).

African Red-bellied Parrot. *Poeocephalus rufiventris* (Rupp.).
Gray Parrot ..... *Psittacus erythacus* Linn.
Grand Lory ..... *Eclectus roratus* (Müll.).
Blue-crowned Parrakeet ... *Tanygnathus luzonesis* (Linn.).
Ring Parrakeet ..... *Palaeornis eupatria* (Linn.).
Ring-necked Parrakeet .... *Palaeornis torquata* (Bodd.).
Rose-winged Parrakeet .... *Palaeornis docilis* (Vieill.).
Blossom-headed Parrakeet. *Palaeornis cyanocephala* (Linn.).
Banded Parrakeet ..... *Palaeornis fasciata* (Müll.).
Malaccan Parrakeet ..... *Palaeornis longicauda* (Bodd.).
Gray-headed Love-bird ... *Agapornis cana* (Gmel.).
Red-faced Love-bird ..... *Agapornis pullaria* (Linn.).
Ceylonese Hanging Parrakeet ..... *Loriculus indicus* (Gmel.).
Pennant Parrakeet ..... *Platycercus elegans* (Gmel.).
Pale-headed Rosella ..... *Platycercus pallidiceps* Vig.
Rosella Parrakeet ..... *Platycercus eximius* (Shaw).
Orange-cheeked Parrakeet. *Platycercus icterotis* (Kuhl.).
Undulated Grass Parrakeet. *Melopsittacus undulatus* (Shaw).
Yellow Grass Parrakeet.... *Melopsittacus undulatus* (Shaw) var.

Order **CORACIIFORMES**, Kingfishers, Hornbills, etc.

Sub-Order **Coraciae.**

Family Coraciidae, Rollers.

European Roller ..... *Coracias garrulus* Linn.

Sub-Order **Halcyones.**

Family Alcedinidae, Kingfishers.

Belted Kingfisher ..... *Ceryle alcyon* (Linn.).
Little Green Kingfisher.... *Ceryle americana septentrionalis* Sharpe.
Giant Laughing Kingfisher. *Dacelo gigas* (Bodd.).

Sub-Order **Bucerotes.**

Family Bucerotidae, Hornbills.

Concave-casque Hornbill... *Dichoceros bicornis* (Linn.).
Malayan Pied Hornbill.... *Anthracoceros convexus* (Temm.).

Sub-Order **Upupae.**

Family UPUPIDAE, Hoopoes.

Hoopoe .....*Upupa epops* Linn.

Sub-Order **Momoti.**

Family MOMOTIDAE, Motmots.

Lesson Mexican Motmot ..*Motmotus lessoni* (Less.).

Sub-Order **Caprimulgi.**

Family CAPRIMULGIDAE, Nigthhawks.

Nighthawk .....*Chordeiles virginianus* (Gmel.).

Sub-Order **Cypseli.**

Family CYPSELIDAE, Chimney Swifts.

Chimney Swift .....*Chaetura pelagica* (Linn.)

Sub-Order **Trochili.**

Family TROCHILIDAE, Hummingbirds.

Ruby-throated Hummingbird .....*Trochilus colubris* (Linn.).

Order **TROGONES,** Trogons.

Family TROGONIDAE, Trogons.

Cuban Trogon .....*Priotelus temnurus* (Temm.).

Order **COCCYGES,** Touracos, Cuckoos, and Anis.

Sub-Order **Musophagi.**

Family MUSOPHAGIDAE, Touracos.

White-crested Touraco ....*Turacus corythaix* (Wagl.).

Sub-Order **Cuculi.**

Family CUCULIDAE, Cuckoos.

Yellow-billed Cuckoo .....*Coccyzus americanus* (Linn.).
Black-billed Cuckoo .....*Coccyzus erythropthalmus* (Wils.).
Road-runner .....*Geococcyx californianus* (Less.).
Groove-billed Ani .....*Crotophaga sulcirostris* Swains.
Guira Cuckoo .....*Guira guira* (Gmel.).

Order **SCANSORES**, Barbets and Toucans.

Sub-Order **Capitones.**

Family CAPITONIDAE, Barbets.

Great Himalayan Barbet...*Megalaema marshallorum* Swinh.

Sub-Order **Rhamphastides.**

Family RHAMPHASTIDAE, Toucans.

Toco Toucan .....*Rhamphastos toco* (Müll.).
Sulphur-breasted Toucan...*Rhamphastos carinatus* Swains.
Short-billed Toucan .....*Rhamphastos brevicarinatus* Gould.
Ariel Toucan .....*Rhamphastos ariel* Vig.
Green-billed Toucan .....*Rhamphastos dicolorus* Linn.
Black-banded Aracari
Toucan .....*Pteroglossus torquatus* (Gmel.).

Order **PICIFORMES**, Woodpeckers.

Sub-Order **Pici.**

Family PICIDAE, Woodpeckers.

Northern Flicker .....*Colaptes auratus luteus* Bangs.
Mexican Red-shafted
Flicker .....*Colaptes cafer cafer* (Gmel.).
Red-headed Woodpecker ..*Melanerpes erythrocephalus* (Linn.).
Golden-fronted Woodpecker .....*Centurus aurifrous* (Wagl.).
Yellow-bellied Sapsucker...*Sphyrapicus varius* (Linn.).
Greater Spotted Woodpecker .....*Dendrocopus major* Linn.
Hairy Woodpecker .....*Dryobates villosus* (Linn.).
Northern Downy Woodpecker .....*Dryobates pubescens medianus* (Swains.).
European Wryneck .....*Iynx torquilla* (Linn.).

Order **PASSERIFORMES**, Perching Birds.

Division **Mesomyodi.**

Family COTINGIDAE, American Chatterers.

Bare-throated Bell-bird ...*Chasmorhynchus nudicollis* (Vieill.).

Family Tyrannidae, Flycatchers.

Trinidad Kiskadee Flycatcher ..... *Pitangus sulphuratus trinitatis* Hellm.
Large-billed Tyrant Flycatcher ..... *Megarynchus pitangua* (Linn.).
Phoebe ..... *Sayornis phoebe* (Lath.).
Least Flycatcher ..... *Empidonax minimus* Baird.
Green-crested Flycatcher .. *Empidonax virescens* (Vieill.).
Wood Pewee ..... *Myiochanes virens* (Linn.)
Kingbird ..... *Tyrannus tyrannus* (Linn.).

Division **Acromyodi.**

Family Hirundinidae, Swallows.

European Swallow ..... *Hirundo rustica* (Linn.).
Barn Swallow ..... *Hirundo erythrogaster* Bodd.

Family Pycnonotidae, Bulbuls.

Burmese Red-bellied Bulbul *Molpastes burmanicus* (Sharpe).
Red-eared Bulbul ..... *Otocompsa emeria* (Linn.).
White-eared Bulbul ..... *Otocompsa leucotis* (Gould).

Family Timeliidae, Babblers.

Melodious Thrush ..... *Leucodioptron canorum* (Linn.).
Himalayan Jay Thrush ... *Garrulax leucolophus* (Hardw.).
White-throated Jay-thrush.. *Garrulax albigularis* (Gould).
Black-throated Jay-thrush.. *Dryonastes chinensis* (Scop.).
Red-bellied Hill Tit ..... *Liothrix luteus* (Scop.).

Family Troglodytidae, Wrens.

House Wren ..... *Troglodytes aëdon* Vieill.
Winter Wren ..... *Nannus hiemalis* (Vieill.).

Family Mimidae, Mockingbirds.

Mockingbird ..... *Mimus polyglottos polyglottos* (Linn.).
Western Mockingbird ..... *Mimus polyglottos leucopterus* (Vig.).
Jamaican Mockingbird .... *Mimus polyglottos orpheus* (Linn.).
Curacao Mockingbird ..... *Mimus gilvus rostratus* Ridgw.
Catbird ..... *Galeoscoptes carolinensis* (Linn.).

Brown Thrasher .....*Toxostoma rufum* (Linn.).
Curve-billed Thrasher ....*Toxostoma curvirostre curvirostre* (Swains.).
Blue Mocking-thrush .....*Melanotis caerulescens* (Swain.).

Family TURDIDAE, Thrushes.

Blue Solitaire .....*Myadestes unicolor* Scl.
Mexican Solitaire .....*Myadestes obscurus* (Lafr.).
Cuban Solitaire .....*Myadestes elizabethae* (Lemb.).
Cuban Robin .....*Mimocichla rubripes* (Temm.).
European Blackbird .....*Merula merula* (Linn.).
American Robin .....*Planesticus migratorius* (Linn.).
Gray Robin .....*Planesticus tristis tristis* (Swains.).
Eastern Gray Robin .....*Planesticus tristis assimilis* (Cab.).
Mexican Tawny Robin ....*Planesticus grayi grayi* (Bonap.).
Tamaulipas Tawny Robin..*Planesticus grayi tamaulipensis* (Nels.).
Ring Ouzel .....*Turdus torquatus* (Linn.).
Red-winged Thrush .....*Turdus iliacus* Linn.
Song Thrush .....*Turdus musicus* Linn.
Wood Thrush .....*Hylocichla mustelina* (Gmel.).
Wilson Thrush .....*Hylocichla fuscescens* (Steph.).
Gray-cheeked Thrush ....*Hylocichla aliciae aliciae* Baird.
Bicknell Thrush .....*Hylocichla aliciae bicknelli* (Ridgw.).
Olive-backed Thrush .....*Hylocichla ustulata swainsoni* (Cab.).
Hermit Thrush .....*Hylocichla guttata pallasii* (Cab.).
Rock Thrush .....*Monticola saxatilis* (Linn.).
European Redstart .....*Phoenicurus phoenicurus* (Linn.).
Red-spotted Bluethroat ...*Cyanosylvia suecica* (Linn.).
White-spotted Bluethroat ..*Cyanosylvia cyanecula* (Macg.).
Nightingale .....*Aëdon luscinia* (Linn.).
English Robin .....*Erithacus rubecula* (Linn.).
Shama Thrush .....*Cittocincla tricolor* (Vieill.).
Whinchat .....*Pratincola rubetra* (Linn.).
Wheatear .....*Saxicola oenanthe* (Linn.).
Black-capped Thrush-Robin*Catharus mexicanus* (Bonap.).
Bluebird .....*Sialia sialis* (Linn.).

Family Sylviidae, Kinglets and Old World Warblers.

Whitethroat .....*Sylvia sylvia* (Linn.).
Lesser Whitethroat .....*Sylvia curruca* (Linn.).
Blackcap Warbler .....*Sylvia atricapilla* (Linn.).
Garden Warbler .....*Sylvia hortensis* Bechst.
Willow Warbler .....*Phylloscopus trochilus* (Linn.).
Wood Warbler .....*Phylloscopus sibilator* (Sal.).

Family Vireonidae, Vireos.

Red-eyed Vireo .....*Vireosylva olivacea* (Linn.).
Warbling Vireo .....*Vireosylva gilva gilva* (Vieill.).
White-eyed Vireo .....*Vireo griseus griseus* (Bodd.).
Yellow-throated Vireo ....*Lanivireo flavifrons* (Vieill.).

Family Ampelidae, Waxing Chatterers.

Cedar Waxwing .....*Ampelis cedrorum* (Vieill.).
Bohemian Waxwing .....*Ampelis garrulus* Linn.

Family Ptilogonatidae, Silky Flycatchers.

Phainopepla .....*Phainopepla nitens* (Swains.).
Mexican Ptilogonys .....*Ptilogonys cinereus cinereus* Swains.

Family Laniidae, Shrikes.

White-backed Piping Crow.*Gymnorhina leuconota* Gould.
Black-backed Piping Crow.*Gymnorhina tibicen* Lath.
Lead-colored Crow-shrike..*Strepera plumbea* Gould.
Northern Shrike .....*Lanius borealis* Vieill.
Loggerhead Shrike .....*Lanius ludovicianus* (Linn.).
Red-backed Shrike .....*Enneoctonus collurio* (Linn.).

Family Paridae, Chickadees and Titmice.

Black-capped Chickadee ..*Penthestes atricapilla* (Linn.).
Marsh Titmouse .....*Poecile palustris* (Linn.).
Great Titmouse .....*Parus major* Linn.
Blue Titmouse .....*Cyanistes caeruleus* (Linn.).
White-headed Long-tailed
Titmouse .....*Aegithalus caudatus* (Linn.).
Long-tailed Titmouse .....*Aegithalus roseus* (Blyth.).

Family PANURIDAE, Bearded Titmice.

Bearded Titmouse .....*Panurus biarmicus* (Linn.).

Family SITTIDAE, Nuthatches.

White-breasted Nuthatch ..*Sitta carolinensis* Lath.
Red-breasted Nuthatch ....*Sitta canadensis* Linn.
European Nuthatch .....*Sitta caesia* Meyer.

Family CERTHIIDAE, Brown Creepers.

Brown Creeper .....*Certhia familiaris americanus* (Bonap.).

Family MNIOTILTIDAE, American Warblers.

Black-and-White Warbler..*Mniotilta varia* (Linn.).
Worm-eating Warbler ....*Helmitheros vermivorus* (Gmel.).
Blue-winged Warbler .....*Helminthophila pinus* (Linn.).
Lawrence Warbler .....*Helminthophila lawrencei* Herrick.
Northern Parula Warbler..*Compsothlypis americana usneae* Brewst.
Yellow Warbler .....*Dendroica aestiva aestiva* (Gmel.).
Magnolia Warbler .....*Dendroica magnolia* (Wils.).
Black-throated Blue Warbler .....*Dendroica caerulescens caerulescens* (Gmel.).
Myrtle Warbler .....*Dendroica coronata* (Linn.).
Black-throated Green Warbler .....*Dendroica virens* (Gmel.).
Chestnut-sided Warbler....*Dendroica pensylvanica* (Linn.).
Blackpoll Warbler .....*Dendroica striata* (Forst.).
Pine Warbler .....*Dendroica vigorsi* (Aud.).
Prairie Warbler .....*Dendroica discolor* (Vieill.).
Yellow Palm Warbler.....*Dendroica palmarum hypochrysea* Ridgw.
Palm Warbler .....*Dendroica palmarum palmarum* (Gmel.).
Connecticut Warbler .....*Oporornis agilis* (Wils.).
Mourning Warbler .....*Oporornis philadelphia* (Wils.).
Ovenbird .....*Seiurus aurocapillus* (Linn.).
Louisiana Water-thrush ...*Seiurus motacilla* (Vieill.).

Water-thrush .....*Seiurus noveboracensis* (Gmel.).
Northern Yellow-throat....*Geothlypis trichas brachydactyla* (Swains.).
Yellow-breasted Chat .....*Icteria virens virens* (Linn.).
Wilson Warbler .....*Wilsonia pusilla* (Wils.).
Canadian Warbler .....*Wilsonia canadensis* (Linn.).
American Redstart .....*Setophaga ruticilla* (Linn.).

Family Motacillidae, Wagtails and Pipits.

Pied Wagtail .....*Motacilla lugubris* (Temm.).
Yellow Wagtail .....*Motacilla campestris* (Pall.).
American Pipit .....*Anthus rubescens* (Tuns.).
Meadow Pipit .....*Anthus pratensis* (Linn.).

Family Alaudidae, Larks.

Horned Lark .....*Otocoris alpestris alpestris* (Linn.).
Prairie Horned Lark .....*Otocoris alpestris pratincola* Hensh.
Skylark .....*Alauda arvensis* Linn.
Crested Lark .....*Galerita cristata* (Linn.).
Wood Lark .....*Lullula arborea* (Linn.).
Siberian Black Lark .....*Melanocorypha yeltoniensis* (Frost.).
Chestnut Finch Lark .....*Pyrrhulauda smithi* Ayres.

Family Fringillidae, Sparrows, Grosbeaks, and Buntings.

Greenfinch .....*Chloris chloris* (Linn.).
Hawfinch .....*Coccothraustes coccothraustes* (Linn.).
Rose-breasted Grosbeak ...*Zamelodia ludoviciana* (Linn.).
Black-headed Grosbeak ...*Zamelodia melanocephala* (Swains.).
Western Blue Grosbeak ...*Guiraca caerulea lazula* (Less.).
Black Seedeater .....*Sporophila corvina* (Scl.).
Morellet Seedeater .....*Sporophila morelleti* (Bonap.).
Trinidad Seedeater .....*Sporophila grisea* (Gmel.).
Pygmy Seedeater .....*Sporophila minuta* (Linn.).
White-throated Seedeater ..*Sporophila albigularis* (Spix.).
Yellow-bellied Seedeater...*Sporophila gutturalis* (Licht.).
Dwarf Weaver Finch .....*Spermestes nana* (Puch.).

Cuban Bullfinch .....*Melopyrrha nigra* (Linn.).
Melodious Grassquit .....*Euetheia canora* (Gmel.).
Yellow-faced Grassquit ...*Euetheia olivacea* (Linn.).
Bahama Grassquit .....*Euetheia bicolor* (Linn.).
Pyrrhuloxia .....*Pyrrhuloxia sinuata* Bonap.
Cardinal .....*Cardinalis cardinalis* (Linn.).
Olive Saltator .....*Saltator olivacens* Cab.
Chaffinch .....*Pinicola enucleator canadensis* (Cab.).
Canadian Pine Grosbeak ..*Fringilla coelebs* Linn.
Brambling .....*Fringilla montifringilla* (Linn.).
European Goldfinch .....*Carduelis carduelis* (Linn.).
American Goldfinch .....*Astragalinus tristis* (Linn.).
Mexican Goldfinch .....*Astragalinus psaltria mexicanus* (Swains.).
European Siskin .....*Chrysomitris spinus* (Linn.).
Siskin+European Goldfinch.Hybrid.
Pine Siskin .....*Spinus pinus* (Wils.).
Black-headed Siskin .....*Spinus notatus notatus* (Du Bus).
Redpoll .....*Acanthis linaria* (Linn.).
Greater Redpoll .....'...*Acanthis linaria rostrata* (Coues).
Hoary Redpoll .....*Acanthis hornemannii exilipes* (Coues).
European Lesser Redpoll ..*Acanthis rufescens* (Vieill.).
Twite or Mountain Linnet..*Cannabina flavirostris* (Linn.).
Linnet .....*Cannabina cannabina* (Linn.).
Snow Finch .....*Montifringilla nivalis* (Linn.).
Mountain Finch .....*Passer montanus* (Linn.).
English Sparrow .....*Passer domesticus* (Linn.).
African Cape Sparrow ....*Passer arcuatus* (Gmel.).
Green Singing-finch .....*Serinus icterus* (Bonn.).
Gray Singing-finch .....*Serinus leucopygius* (Sund.).
Black-throated Singing-finch .....*Serinus angolensis* (Gmel.).
Canary .....*Serinus canaria* (Linn.).
Canary+European Goldfinch .....Hybrid.
Saffron Finch .....*Sycalis flaveola* (Linn.).
Rosy Finch .....*Carpodacus erythrinus* (Pall.).
Purple Finch .....*Carpodacus purpureus* (Gmel.).

Mexican House Finch ....*Carpodacus mexicanus mexicanus* (Müll.).
House Finch .....*Carpodacus mexicanus frontalis* (Say).
European Crossbill .....*Loxia curvirostra* Linn.
American Crossbill .....*Loxia curvirostra minor* (Brehm.).
White-winged Crossbill ...*Loxia leucoptera* Gmel.
Bullfinch .....*Pyrrhula europaea* Vieill.
Russian Bullfinch .....*Pyrrhula pyrrhula* (Linn.).
Reed Bunting .....*Emberiza schoeniclus* Linn.
Yellow-hammer .....*Emberiza citrinella* Linn.
Ortolan Bunting .....*Emberiza hortulana* Linn.
Snowflake .....*Plectrophenax nivalis nivalis* (Linn.)
White-throated Sparrow ..*Zonotrichia albicollis* (Gmel.).
White-crowned Sparrow ..*Zonotrichia leucophrys* (Forst.).
Nonpareil .....*Passerina ciris* (Linn.).
Indigo Bunting .....*Passerina cyanea* (Linn.).
Slate-colored Junco .....*Junco hyemalis hyemalis* (Linn.).
Chipping Sparrow .....*Spizella passerina* (Bechst.).
Field Sparrow .....*Spizella pusilla* (Wils.).
Tree Sparrow .....*Spizella monticola* (Gmel.).
Savanna Sparrow .....*Passerculus sandwichensis savanna* (Wils.).
Dickcissel .....*Spiza americana* (Gmel.).
Western Lark Sparrow....*Chondestes grammacus strigatus* (Swains.).
Vesper Sparrow .....*Pooecetes gramineus* (Gmel.).
Song Sparrow .....*Melospiza melodia melodia* (Wils.).
Swamp Sparrow .....*Melospiza georgiana* (Lath.).
Sharp-tailed Sparrow ....*Ammodramus caudacutus caudacutus* (Gmel.).
Fox Sparrow .....*Passerella iliaca* (Merr.).
Towhee .....*Pipilo erythrophthalmus* (Linn.).
Chestnut-capped Buarremon Sparrow...*Buarremon brunneinuchus* (Lafres).
Pileated Finch .....*Coryphospingus pileatus* Neuw.
Red-crested Cardinal .....*Paroaria cucullata* (Lath.).
Red-headed Cardinal .....*Paroaria larvata* (Bodd.).
Green Cardinal .....*Gubernatrix cristata* (Vieill.).

Family Coerebidae, Sugar-birds and Honey-creepers.

Blue Sugar-bird .....*Dacnis cayana* (Linn.).
Bahama Honey Creeper ...*Coereba bahamensis* (Reich.).
Yellow-winged Sugar-bird..*Coereba cyanea* (Linn.).

Family Tangaridae, Tanagers.

Green Tanager .....*Chlorophonia viridis* (Vieill.).
Violet Euphonia .....*Euphonia violacea* (Linn.).
Thick-billed Euphonia ....*Euphonia crassirostris* Scl.
Bonaparte Euphonia .....*Euphonia hirundinacea* Bonap.
Superb Tanager .....*Calliste fastosa* (Less.).
Blue Tanager .....*Tangara cana cana* Swains.
Trinidad Blue Tanager ...*Tangara cana sclateri* (Berl.).
White-shouldered Blue Tanager .....*Tangara episcopus* Linn.
Northern Palm Tanager ..*Tangara palmarum melanoptera* (Hartl.).
Abbot Tanager .....*Tangara abbas* Licht.
Scarlet Tanager .....*Piranga erythromelas* Vieill.
Brick-red Tanager .....*Piranga testacea* Scl.
Hepatic Tanager .....*Piranga hepatica* Swains.
Northern Silver-beak Tanager .....*Ramphocelus jacapa magnirostris* (Lafr.).
Cuban Banana Tanager ...*Spindalis pretrei* (Less.).
Red-crowned Tanager ....*Tachyphonus coronatus* (Vieill.).
Trinidad Black Tanager ..*Tachyphonus rufus* (Bodd.).
Brown-headed Tanager ...*Chlorospingus ophthalmicus* (Du Bus).

Family Ploceidae, Weaver-birds.

Paradise Whydah-bird ....*Vidua paradisea* (Linn.).
Pin-tailed Whydah-bird ...*Vidua principalis* (Linn.).
Giant Whydah-bird .....*Coliuspasser progne* (Bodd.).
Red-collared Whydah-bird .*Coliuspasser ardens* (Bodd.).
Yellow-backed Whydah-bird .....*Coliuspasser macrourus* (Gmel.).
Red-shouldered Whydah ..*Urobrachya axillaris* (Smith).
Crimson-crowned Weaver ..*Pyromelana flammiceps* Swains.
Orange Weaver .....*Pyromelana franciscana* (Isert).

Napoleon Weaver .....*Pyromelana afra* Gmel.
Red-billed Masked Weaver.*Quelea quelea* Linn.
Russ Masked Weaver .....*Quelea russi* (Finsch).
Bronze Manikin .....*Spermestes cucullatus* Swains.
Magpie Manikin .....*Amauresthes fringilloides* Lafres.
Quail Finch .....*Ortygospiza polyzona* (Temm.).
Little Ruddy Waxbill ....*Lagonosticta brunniceps* Sharpe.
Fire Finch .....*Lagonosticta minima* (Vieill.).
Lavender Waxbill .....*Lagonosticta caerulescens* Vieill.
Cut-throat .....*Amadina fasciata* Gmel.
Red-headed Finch .....*Amadina erythrocephala* (Linn.).
Diamond Sparrow .....*Steganopleura guttata* Shaw.
Crimson-winged Finch ....*Pytelia phoenicoptera* Swains.
Combassou .....*Hypocraera aenea* Hartl.
Zebra Finch .....*Taeniopygia castanotis* (Gould).
Strawberry Finch .....*Sporaeginthus amandava* (Linn.).
Orange-cheeked Finch ....*Sporaeginthus melpodus* Vieill.
Zebra Waxbill .....*Sporaeginthus subflavus* Vieill.
Java Sparrow .....*Munia oryzivora* Linn.
White Java Sparrow .....*Munia oryzivora* Linn. var.
Three-colored Manikin ....*Munia malacca* Linn.
White-headed Manikin ....*Munia maja* Linn.
Black-headed Manikin ....*Munia atricapilla* Vieill.
Chestnut-breasted Manikin.*Munia castaneithorax* Gould.
Gould Yellow-rumped
Manikin .....*Munia flavipyrmna* Gould.
Spice Manikin .....*Munia punctulata* Linn.
White-breasted Manikin...*Munia pectoralis* (Gould).
Sharp-tailed Finch .....*Uroloncha acuticauda* (Hodgs.).
African Silver-bill .....*Aidemosyne cantans* Gmel.
Indian Silver-bill .....*Aidemosyne malabarica* Linn.
Bengalee .....*Aidemosyne malabarica*+*Uroloncha striata.*
Red-tailed Finch .....*Bathilda ruficauda* (Gould).
Long-tailed Grass Finch...*Poephila acuticauda* Gould.
Grass Finch .....*Poephila cincta* Gould.
Masked Grass Finch .....*Poephila personata* Gould.
Black-headed Gouldian
Finch .....*Poephila gouldiae* (Gould).
Red-faced Gouldian Finch.*Poephila mirabilis* Hombr.

Pin-tailed Nonpareil .....*Erythrura prasina* Sparrm.
Cordon Bleu .....*Estrilda phoenicotis* Swains.
Blue-breasted Waxbill ....*Estrilda angolensis* (Linn.).
Black-faced Waxbill .....*Estrilda erythronota* (Vieill.).
St. Helena Waxbill .....*Estrilda astrilda* Linn.
Common Waxbill .....*Estrilda cinerea* Vieill.
Scaly-fronted Weaver .....*Sporopipes squamifrons* (Smith).
Madagascar Weaver .....*Foudia madagascariensis* Linn.
Reichenback Masked
Weaver .....*Hyphantornis taeniopterus* (Reich.).
Masked Weaver Bird .....*Hyphantornis velatus* (Vieill.).
Striped Masked Weaver ...*Hyphantornis lineolatus* Sharpe.
Black and Yellow-mantled
Weaver .....*Hyphantornis cucullatus* (Müll.).
White-headed Weaver .....*Dinemellia dinemelli* (Rupp.).

Family Icteridae, Cowbirds, Blackbirds, and American Orioles.

Bobolink .....*Dolichonyx oryzivorus* (Linn.).
Cowbird .....*Molothrus ater ater* (Bodd.).
Dwarf Cowbird .....*Molothrus ater obscurus* (Gmel.).
Argentine Cowbird .....*Molothrus bonariensis* (Gmel.).
Lesser Trinidad Cowbird...*Molothrus atronitens* (Cab.).
Bay-winged Cowbird .....*Molothrus badius* Vieill.
Red-eyed Cowbird .....*Callothrus robustus* (Cab.).
Red-winged Blackbird ....*Agelaius phoeniceus phoeniceus*
(Linn.).
Vera Cruz Red-winged
Blackbird .....*Agelaius phoeniceus richmondi*
Nelson.
Rufous-shouldered
Blackbird .....*Agelaius humeralis* (Vig.).
Little Yellow-headed Black-
bird .....*Agelaius icterocephalus* (Linn.).
Yellow-headed Blackbird...*Xanthocephalus xanthocephalus*
(Bonap.).
Orange-headed Blackbird. *Amblyrhamphus holosericeus*
(Scop.).
Meadowlark .....*Sturnella magna* (Linn.).
Western Meadowlark .....*Sturnella neglecta* Aud.
Troupial .....*Icterus icterus* (Linn.).

Baltimore Oriole .....*Icterus galbula* (Linn.).
Orchard Oriole .....*Icterus spurius* (Linn.).
Cuban Oriole .....*Icterus hypomelas* (Bonap.).
Wagler Oriole .....*Icterus wagleri* Sel.
Hooded Oriole .....*Icterus cucullatus* (Swains.).
Yellow-tailed Oriole .....*Icterus mesomelas* (Wagl.).
Bullock Oriole .....*Icterus bullocki* (Swains.).
Alta Mira Oriole .....*Icterus gularis tamaulipensis* Ridgw.
Purple Grackle .....*Quiscalus quiscula quiscula* (Linn.).
Bronzed Grackle .....*Quiscalus quiscula aeneus* (Ridgw.).
Little Boat-tailed Grackle..*Quiscalus lugubris* Swains.
Great-tailed Grackle .....*Megaquiscalus major macrourus* Swains.
Chopi Boat-tail .....*Aphobus chopi* (Vieill.).

Family ORIOLIDAE, European Orioles.

European Golden Oriole ..*Oriolus galbula* Linn.
Black-headed Indian Oriole.*Oriolus melanocephalus* Linn.

Family EULABETIDAE, Glossy Starlings.

Purple-crowned Glossy Starling .....*Calornis metallica* (Temm.).
Green Glossy Starling ....*Calornis chalybea* (Horsf.).

Family STURNIDAE, Starlings and Mynas.

English Starling .....*Sturnus vulgaris* Linn.
Malabar Myna .....*Poliopsar malabaricus* (Gmel.).
Black-headed Myna .....*Temenuchus pagodarum* (Gmel.).
Common Myna .....*Acridotheres tristis* (Linn.).
Brown Myna .....*Acridotheres fuscus* (Wagl.).
Yellow-crowned Myna ....*Ampeliceps coronatus* (Blyth.).
Larger Hill Myna .....*Mainatus intermedius* (Hay).
Rose-colored Pastor .....*Pastor roseus* (Linn.).

Family CORVIDAE, Ravens, Crows, and Magpies.

European Raven .....*Corvus corax corax* Linn.
American Raven .....*Corvus corax sinuatus* (Wagl.).
Northern Raven .....*Corvus corax principalis* Ridgw.
White-necked Raven .....*Corvus cryptoleucus* Couch.

Rook .....*Corvus frugilegus* Linn.
Jackdaw .....*Corvus monedula* Linn.
American Crow .....*Corvus brachyrhynchus* (Brehm.).
Fish Crow .....*Corvus ossifragus* Wils.
Clark Nutcracker .....*Nucifraga columbiana* (Wils.).
European Magpie .....*Pica pica pica* Linn.
American Magpie .....*Pica pica hudsonia* (Sab.).
White-throated Magpie-Jay *Callocitta formosa formosa* (Swains.).
Green Hunting Crow .....*Cissa chinensis* (Bodd.).
Wandering Tree-Magpie...*Dendrocitta rufa* (Scop.).
Green Jay .....*Xanthoura luxuosa luxuosa* (Less.).
Rio Grande Green Jay ....*Xanthoura luxuosa glaucescens* Ridgw.
California Jay .....*Aphelocoma californica* (Vig.).
Woodhouse Jay .....*Aphelocoma woodhouseii* (Baird).
Mexican Sieber Jay .....*Aphelocoma sieberii sieberii* (Wagl.).
Talamanca Jay .....*Cyanocorax affinis zeledoni* Ridgw.
Blue Jay .....*Cyanocitta cristata cristata* (Linn.).
Florida Blue Jay .....*Cyanocitta cristata florincola* Coues.
Blue-fronted Jay .....*Cyanocitta stelleri frontalis* (Ridgw.).
Aztec Jay .....*Cyanocitta stelleri azteca* Ridgw.
European Jay .....*Garrulus glandarius* (Linn.).
Lanceolated Jay .....*Garrulus lanceolatus* Vig.
Canada Jay .....*Perisoreus canadensis canadensis* (Linn.).
Alpine Chough .....*Pyrrhocorax alpinus* Vieill.

BY-LAWS

OF THE

NEW YORK ZOOLOGICAL SOCIETY

AMENDED TO JANUARY 19, 1909.

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 the Director of the Zoological Park.
7. Report of Director of the Aquarium.
8. Election of Managers.
9. Communications.
10. Miscellaneous business.
11. 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 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. All candidates for election as Managers must be Life Members, Patrons, Associate Founders, or Founders of the Society.

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, the Director of the Aquarium, 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 of the Zoological Park.
8. Report of Director of the Aquarium.
9. Election of Officers.
10. Election of Committees.
11. Election of new members.
12. Communications.
13. 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, warrants from the City, 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, Aquarium, 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 Committee, 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.

SEC. 7. The Director of the Aquarium shall be elected annually by the Executive Committee, and shall hold office until removed or his successor is chosen by said Committee. He shall be the responsible administrative officer of the Aquarium, and shall recommend to the Executive Committee all candidates for positions in the Aquarium. The Director of the Aquarium shall be *ex-officio* a member and Chairman of the Aquarium Commitee. He shall perform such other duties in connection with the Aquarium 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-ficio*. 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, Park, and Aquarium, 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 and Aquarium shall be made or approved by the Executive Committee.

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

SEC. 6. The Executive Committee shall annually appoint an Aquarium Committee, whose duties and powers are set forth in Section 11 of Article IV of these By-Laws.

SEC. 7. 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. 8. It shall also appoint a Scientific Council, whose powers and duties are set forth in Section 2 of Article V of these By-Laws.

SEC. 9. The Committee shall make a written report at each regular meeting of the Board of Managers.

SEC. 10. 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, of the Director of the Zoological Park, and of the Director of the Aquarium, and any other accounts of the Society, and shall report to the Board of Managers at its annual meeting.

SEC. 11. The Executive Committee shall annually appoint an Aquarium Committee, not to exceed eight members of this Society, who shall hold office until their successors are chosen. All vacancies shall be filled by the Executive Committee. The Director of the Aquarium shall be *ex-officio* a member and the Chairman of the Aquarium Committee, and such Committee may vest in him any or all of its powers. The Chairman of the Executive Committee and the Secretary of the Society shall also be *ex-officio* members of the Aquarium Committee. Three members shall constitute a quorum. The Executive Committee may delegate to the Aquarium Committee such powers as it may deem proper.

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 Chairman of the Executive Committee and the Secretary of the Society shall be members *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 as 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. There shall be a class known as Fellows, which shall consist of members of the Society who have rendered marked services to science, and shall be chosen by the Executive Committee. The privileges and dues of Fellows shall be, in all respects, the same as those of regular members of the Society.

SEC. 5. 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 curent 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. 6. The payment of $200 at one time shall constitute any member a Life Member.

SEC. 7. 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. 8. 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. 9. 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. 10. Any member who shall have donated to the Society ten thousand dollars ($10,000), or its equivalent, may be elected by the Board of Managers or the Executive Committee a Founder in Perpetuity. Such Founder in Perpetuity shall have the power to designate by a last will and testament his successor, who shall thereupon be entitled to all the rights and privileges of the original Founder in Perpetuity, including the right of designating in turn his successor.

SEC. 11. Any member who shall have donated to the Society $25,000, or its equivalent, may be elected by the Board of Managers, or the Executive Committee, a Benefactor. Benefactors shall have the rights and privileges of a Founder in Perpetuity.

SEC. 12. 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. 13. A resident member who shall have rendered marked scientific or professional services to the Society in any branch of its work may be elected by the Executive Committee a Life Member, Patron, Associate Founder, or Founder. A resident of New York who shall have rendered marked service in zoology or natural history may be elected by the Executive Committee a Permanent Fellow.

SEC. 14. 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 eletced Corresponding Members.

SEC. 15. Benefactors, Founders in Perpetuity, 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 to the Park and Aquarium 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 in Perpetuity, 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 Comptrollers' 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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