

Zoological Parks and Aquariums



AMERICAN ASSOCIATION OF ZOOLOGICAL
PARKS AND AQUARIUMS

ZOOLOGICAL PARKS AND AQUARIUMS

may be purchased by members of the American Institute of Park Executives and American Association of Zoological Parks and Aquariums for fifty cents each, not to exceed five copies. The public may purchase the book for \$1.00.

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American Association of Zoological Parks and Aquariums

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To

Dr. William T. Hornaday

SCIENTIST, SPORTSMAN, AUTHOR;
FRIEND AND DEFENDER OF OUR
WILD LIFE, AND FOR THIRTY
YEARS DIRECTOR OF THE NEW
YORK ZOOLOGICAL PARK—THIS
1st ANNUAL BOOK IS DEDICATED

ZOOLOGICAL PARKS AND AQUARIUMS

*An Annual Assemblage of Information and Facts by the
American Association of Zoological Parks and Aquariums*

Edited by
WILL O. DOOLITTLE
Managing Editor PARKS & RECREATION

VOL. I

AMERICAN ASSOCIATION OF ZOOLOGICAL
PARKS AND AQUARIUMS

Affiliated with American Institute of Park Executives

1932



GEORGE P. VIERHELLER

Chairman American Association of Zoological Parks and Aquariums
and Director St. Louis Zoological Park

FOREWORD

THE widespread interest in the development of Zoological Parks throughout the country has prompted the officers of the American Association of Zoological Parks and Aquariums to prepare, in book form, important papers that have appeared in our official publication in recent years. These papers include important items on various parks, such as statistics, acreage, number of animals, governing power, etc. This material should be of great value, not only to established zoological institutions, but also to many cities that contemplate starting animal exhibits.

The great success that a number of cities have had with their Gardens is prompting other communities to investigate the matter with the purpose of encouraging their citizenship to invest in a like enterprise. As a rule, we have found that the interested parties are at a loss as to how to proceed. They realize that although there are many ways to start, it is difficult to find the way which would be the most advisable, and that once the proper nucleus for the condition has been selected, it is even more difficult to decide upon the most satisfactory and profitable way to develop it. We believe this publication is going to be helpful in solving such problems, and that, in so doing, it will fill a demand that has been extremely urgent.

The first issue gives accounts of such subjects as management, construction, financing, handling, and publicity. These phases of the Zoological enterprise are treated in a very thorough manner by some of the best authorities in the country.

It is only fitting that the opening chapter of this publication should be given over to an article by the dean of all Zoological Park directors—Dr. Wm. T. Hornaday. His vast experience in the formation and management of the great New York Zoological Park over a period of nearly thirty years, and observations noted in his contact with the work throughout the world, gives him an excellent foundation for writing the article contained in this book, "Observations on Zoological Park Foundations."

The officers of the American Association of Zoological Parks and Aquariums sincerely hope that this publication will be serviceable. If it proves of any value whatever, our labor will be amply rewarded, but if it meets with the success we anticipate, it will create a demand for further publications, especially one on the feeding and housing of animals.

GEORGE P. VIERHELLER,
*Chairman, American Association of
Zoological Parks and Aquariums.*

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Inscribed for Ken Kawata with the best regards of

Roger Conant

16 Jan. 1966



DR. W. M. MANN
Vice Chairman
Director National Zoological Park



ROGER CONANT
Secretary
Educational Director and Curator of
Reptiles Toledo Zoological Park



JOHN T. MILLEN
Director
Director Detroit Zoological Park



EDMUND HELLER
Director
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OFFICERS AND DIRECTORS AMERICAN ASSOCIATION OF ZOOLOGICAL
PARKS AND AQUARIUMS

INTRODUCTION

"**Z**OOLOGICAL PARKS AND AQUARIUMS," the first Annual to be issued by the American Association of Zoological Parks and Aquariums, represents in some measure the service that has been rendered by this organization during the over seven years of its existence. This book is a compendium of the useful information that has been contributed by members through its official magazine, *PARKS & RECREATION*, with the addition of statistical and other material that should prove of value to cities contemplating the establishment of zoological parks and gardens and aquariums, as well as to those who are in charge of such institutions and those who are interested in them as important scientific, educational and recreational sources.

The American Association of Zoological Parks and Aquariums was thus tied in with October, 1924, at the annual convention of the American Institute of Park Executives at Washington, D. C. Membership is of two classes—(a) representatives from the Institute who are engaged in an executive capacity as directors, superintendents or curators of zoological gardens or aquariums, and (b) those who are interested in any way in the work pertaining to them. These latter are admitted through membership in The American Park Society, the non-technical branch of the Institute.

The American Association of Zoological Parks and Aquariums was thus tied in with the Institute and Society because it was realized that zoos and aquariums are usually a branch of park and recreation service and always its problems are allied to those of the older organizations. Experience has shown the wisdom of coördinating the work of these organizations and the benefits that have been derived by the co-incidental meetings.

The success and solidarity of the Association, while contributed to by all members, was initiated by a few of the leading zoological park executives of the United States, foremost of whom was Edward H. Bean, then director of the Milwaukee Zoological Park; George P. Vierheller, director of the St. Louis Zoological Garden; Harry M. Wegeforth, president of the San Diego Zoological Society; C. Emerson Brown, director of the Philadelphia Zoological Garden; Clarence L. Brock, superintendent of Houston parks. These men are mentioned because they were instrumental in effecting the organization and in grasping its opportunities for efficient service. The Association's chief and presiding officer is a chairman. C. Emerson Brown held this position for the first five years, being succeeded by Edward H. Bean, who in turn was succeeded by George P. Vierheller.

The Association has promoted zoological parks in a conservative and consistent way; it aims to exhibit animals only under the most favorable and logical conditions; it believes it necessary to have forethought and expert judgment on the part of those who promote, establish and administer such exhibits; its facilities and the knowledge of its members are available in the public interest; its objectives include not merely more zoos and aquariums but better designed, more attractively constructed, more ably and scientifically kept, more judiciously financed ones; the Association is convinced of the great influence for good given by the right kinds of zoos and aquariums; it advocates the conservation of wild life and the dissemination of facts instead of theories; it sets a high standard for its institutions in the belief that they are worthy of such.

The presentation of "ZOOLOGICAL PARKS AND AQUARIUMS"—our first Annual, gives to its readers an assemblage of ideas and facts, illustrative of our policies as outlined above.

—THE EDITOR.



DR. W. REID BLAIR
Director New York Zoological Park



EDWARD H. BEAN
Director Chicago Zoological Park



C. EMERSON BROWN
Director Philadelphia Zoological Garden



SOL A. STEPHAN
Veteran General Manager Cincinnati
Zoological Park

FOUR EMINENT ZOOLOGICAL PARK DIRECTORS EAST OF THE MISSISSIPPI



CLARENCE L. BROCK
Superintendent of Parks in Charge of
Houston Zoological Gardens



DR. HARRY M. WEGEFORTH
President San Diego Zoological Society



N. T. ("TEX") CLARK
Director Swope Park Zoological Gardens
of Kansas City



CLYDE E. HILL
Director Denver Zoological Gardens

FOUR PROMINENT ZOOLOGICAL PARK MEN WEST OF THE MISSISSIPPI



To
Ken Kawato
with best
wishes from
Will King
Marlin Perkins

H. MARLIN PERKINS
Curator of Reptiles St. Louis Zoological Park



HUGH S. DAVIS
Assistant Director Tulsa Zoological Garden



ERNEST B. SMITH
Park Superintendent in Charge of
Oklahoma City Zoo

YOUNG MEN IN ZOOLOGICAL PARK WORK

Modern demands call for well trained and progressive executives. These three young men and Roger Conant of Toledo are examples of future energetic and efficient leadership.

Sincerely Hugh S. Davis

OBSERVATIONS ON ZOOLOGICAL PARK FOUNDATIONS*

By DR. WILLIAM T. HORNADAY

A man may select a gun, a watch, or a wife, according to the dictates of his own fancy and the peculiarities of his own sweet will. The results concern few people other than himself, and his own bank account pays the cost. The man who designs and helps to found and develop a public institution that is paid for with money either privately or publicly contributed, is in quite a different case. His responsibility is broad and far-reaching. In designing and constructing he cannot afford to make mistakes, because if he does so the cost thereof will be upon innocent persons.

In view of the fact that hundreds of thousands of dollars are now being annually expended in the United States upon the construction of municipal zoos, and the additional fact that in the near future millions of dollars are to be expended, I feel impelled to offer a few observations that are intended to be helpful. My purpose is to promote the avoidance of costly mistakes in permanent improvements.

Every public improvement that turns out when finished to be a failure, either in design or in construction, quickly becomes a public eyesore and a calamity. No mayor nor park commissioner cares to assume the responsibility of tearing down a new building blunder, and therefore the mistake endures. When a wealthy private individual erects a folly palace that disfigures the earth and advertises the owner's mental deficiencies, it is his own funeral. When he dies his children refuse to live in it, and sometimes it descends to his servants, the rats and the bats. The eyesore public building, like the brook, goes on forever.

At this moment there are thirty-four cities in the United States that either have zoological parks or gardens or zoos, or are

endeavoring to establish them. Of these, thirty may be listed as being in the early stages of their development, and four only can be regarded as actually settled in life. These figures mean, if they mean anything, a very large aggregate of expenditures in the near future, running well up into millions of dollars.

There are no buildings so difficult to design correctly and economically as buildings for housing and exhibiting living quadrupeds, birds and reptiles. The chances for error and extravagance are deplorably numerous. This paper is offered as a solemn warning to all founders of new zoological gardens, parks and zoos to mind their steps in the early stages.

In the first place, no society, city or other municipality should begin the development of a zoo without carefully studying a general plan, designed to fit a carefully selected location. In the selection of a site for a zoo, there are about ten requirements to be considered, not one of which can safely be ignored and of which the greatest possible number should be met.

Sometimes it happens that on account of the ignorance or indifference of a municipal population the far-seeing and broad-minded people who seek to start a zoo feel that they dare not come out in the open with a proposal for a zoo that will cost a sum in six figures. To the man who never has traveled, \$20,000 per year for zoo maintenance looks like a huge sum. In all such cases it is wise to defer the initiative, conduct a campaign of education and wait until the proletariat concerned has acquired sufficient intelligence to appreciate a good free show of wild animals, and become willing to pay a few cents per capita for its maintenance. Why waste valuable years in hammering cold iron, or to induce stupid people to create public benefits for themselves? In an intelligent community

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the founding of a new museum, art gallery, library or zoo becomes a pleasure.

I now will offer a few suggestions in the hope that they will prove constructive and useful. They will be addressed particularly to park commissioners and to other men of public spirit who appreciate wild life, and at the same time desire to do something worth while for their home cities. The number of men who sincerely desire to leave the world brighter and better than they found it is really quite large.

I advise and urge every zoological park founder to take with the utmost seriousness the obvious necessity of securing expert advice and skilled assistance. Ordinarily, I shun the word "expert" because it has of late been so fearfully overworked in the commercial world, but I mean it, just the same. The men of "big business" long ago learned the value of expert knowledge, and for their enterprises they buy the very best they can get, no matter what the cost. They have learned that in difficult enterprises, cheap help in foundation work is altogether too expensive.

But how is it with the groups of men who decide to found a city zoo? Do they raise money with which to pay cash for the best experts available? I think that only a very few ever have done so. The majority find that money-raising to pay for nothing but advice is so difficult that they put the cart before the horse by first taking on some live animals. In all logical zoo development, the live animals should be the last things to be acquired, not the first. At all times shun temporary installations, for they are apt to prove leaden weights on the car of progress.

The founding of the New York Zoological Park, in a city already crowded with costly institutions for all-highest education, was a supremely difficult task. The Zoological Society spent two years of diligent effort, and \$12,000 in money, in developing and laying down before the taxpayers of New York its elaborate general plan of the proposed foundation. On that plan

every building, den aviary, range, and corral that was desired and intended was carefully located and shown. Every road, walk and pond appeared. When the city chamberlain asked to know the annual cost of maintaining such an establishment as that, at the risk of his life the director desperately answered, "\$100,000."

Then the question in each mind was, "Will those figures kill the plan, or cure it?" The answer came quickly, and from that day to this it has remained New York City's answer. Said General Anson G. McCook, "Well, an institution like that would be worth \$100,000 a year to the people of New York City." And the bargain was quickly closed.

Because of the fact that the Society originally designed and determined to execute a zoological park as an educational institution and not a spectacular under-study of Luna Park at Coney Island, the wealthy men and women, the well-to-do citizens and the city taxpayers as a whole have made their zoological park what it is. The average American citizen and taxpayer is willing to pay reasonably for the creation and support of fine educational institutions that will benefit his children. If he and his children can derive both recreation and knowledge from a public institution, it is difficult for him to refuse to support it. The best people are most interested in the finest work.

I am convinced that many of the founders of municipal zoos lose much by not strongly exploiting and stressing early and often, the practical and pronounced value of even the smallest and humblest zoos as educational factors. It is easier,—and far less expensive, to found a zoo or zoological park on a thoroughly-recognized educational basis than to build one on a spectacular basis. The creation of a tremendous mountain and cliff spectacle on a level plain in a zoo is a hazardous undertaking, and in proportion to the number and kinds of living animals that can be displayed the cost is enormous. Both in Europe and America there are to

be found spectacular installations for lions, tigers and bears that display to the visitor a huge maximum of artificial rocks, such as those animals never inhabit in their wild lives,—and a minimum number of animal species and specimens. As educational exhibits, I advocate more species of animals, closer acquaintance between visitors and animals, and far less cost.

This spectacular idea originated in 1898 with my dear friend Carl Hagenbeck, greatest of all wild animal collectors, and in that same year he offered it to us for the bear dens of our unborn zoological park. After careful consideration, it became clear to me that for an educational exhibit of the many species of bears of the world, it would yield too little, and cost too much. But even more serious than its extravagant cost, I found that Mr. Hagenbeck's plan would push the animals so far away from visitors that fully one-half their potential educational value would be lost. People who would study animals always desire to get as close to them as possible.

Educational value in a zoo can be secured only through precise zoological knowledge employed first in the designing and planning of the establishment, and afterward in the collecting, exhibiting and management of the living things displayed. An architect without zoological knowledge is no more fit to plan and erect a reptile house or monkey house without expert coöperation than a zoologist is fit to erect and equip an astronomical observatory. Years and years ago, the city park commissioners of America learned the wisdom of sending for Frederick Law Olmsted, or Warren H. Manning, or H. A. Caparn, to journey as far as might be necessary, to advise and assist them in the laying-out of their municipal parks. But do they ever do likewise in designing animal buildings for their municipal zoos? I know of only two American cities, Boston and Chicago, whose park commissioners ever have done so. I now hear, in my mind, a question which says, "But where are trained zoological garden zoo-

logists to be found?" To this I answer: Because there has been up to this date no real demand for such men, there is as yet no good supply! Whenever the young men of America become convinced that in the new zoos of America there is a real field for zoo zoologists, it is very certain that many desirable young men will specially fit themselves to enter it. Until such a demand is assured, why should any capable man specially fit himself to fill it?

As a matter of unevadable duty, the New York Zoological Park has accepted several young men for courses of practical study, and training in the care of wild creatures in captivity. Some of these are now head-keepers, some are curators and superintendents, and one writes his name above the word "director."

Following the bad examples of most European gardens, in the great majority of American zoos the labeling of the exhibits is given but scant attention. The result of this deplorable habit is a distinct loss to the public, and also to the zoo itself. It is not a good thing to treat the very serious business of labeling with open indifference. Visitors readily recognize this spirit. Long ago the museum curators of America awakened to a realization of the virtues of descriptive labels, but none of them has in this industry anything "on" the Zoological Park of New York. Twenty-five years ago, we began to put up all the descriptive labels, maps and charts that we thought the traffic would stand. This was done partly as a duty and partly as a pleasure. After a quarter century of effort, we believe that this educational industry has resulted in a very marked increase in correct zoological knowledge, and of public interest in wild animals.

Every zoological establishment, great or small, should have, high up on its staff, at least one zoologist who is competent to handle, along with his other duties, the educational side of its exhibits. The business of feeding and cleaning is highly necessary but it is not all in all in zoo maintenance.

In cataloging the difficulties in zoo creation and maintenance, there are several that have strong claims to first place. Of course, the first difficulty is *money*; but there are others. As the greatest difficulty to be surmounted, I place *expert service*. This is a requirement that is universal, from the president's chair down to the assistant cleaner. To ignore it is dangerous, and sometimes fatal. In coping with this difficulty in a short market, both patience and money are necessary. If a candidate is good but not quite up to the mark, invite him to complete his education, and acquire some special training before he enters upon his work.

To the credit of the men in municipal offices who are apt to be spoken of carelessly as "politicians," it is to be said that today all save a few of them appreciate the fact that in zoos, of all places, appointments must be based on special fitness and ability, and that good men must be let alone so long as they continue to make good. I think that today it is only the most hard-boiled mayor who has the hardihood to destroy the discipline of his city zoo in order to prevent incompetent keepers from being removed, or to force an incompetent man into a position that he cannot fill.

In the selection of animal keepers, a strict observance of the rules of a civil service commission is almost certain to result in the insertion of a large percentage of round pegs into square holes. The best civil service examiner is the director or superintendent who is to be held responsible for the work of the men under him, and the more a civil service commission heeds his judgment in making his selections, the better for the service. I hold that the head of every

zoological park or zoo absolutely requires complete freedom in the selection and discharge of the employees for whose acts he is held responsible. For twenty-five years it has been a rule in the New York Zoological Park that no head of a department shall be forced to accept or to continue the services of any person who is not satisfactory to him. One result of this rule is that every head of a department goes quite to the utmost limits of patience and forbearance before finally asking that an employe shall be discharged.

In planning installations for captive wild animals on public exhibition, there are certain fundamental principles that are permanently fixed. To enumerate here even the half of them would mean the writing of another chapter. They involve generous space allotments; perfect floor conditions; good light, good air, whatever shade and seclusion is necessary; the companionship of other animals; humane wire netting instead of iron bars, wherever netting is possible; playgrounds for bears, apes, monkeys, hoofed animals and birds; an abundance of pure water, and freedom from annoyances and destructive feeding by visitors.

An animal that can not be kept in comfortable captivity should not be kept at all. Real solitary confinement is a horror that should not be inflicted upon any healthy warmblooded animal. Solitary animals, by which I mean animals that can see no others, suffer from loneliness just as men do. Let animals confined singly at least *see* their neighbors.

A fine show of animal collections, well fed, clean, happy and well labeled, is enough to make any zoo popular with the public, and enlist generous support.



FINANCING A ZOOLOGICAL GARDEN

By GEORGE P. VIERHELLER, *Director Zoological Garden, St. Louis, Mo.*

Every human being desires to have some trait in his character which will cause him to stand apart from others. He wishes to have something in his makeup which will cause men to seek his company. That same desire to stand apart and be sought may be attributed to cities. Every thriving city which contains enterprising and progressive officials and citizens is striving to build up some one feature within the community which will have the power to attract outside visitors, for an increasing number of favorably impressed visitors insures wealth and renown, both of which are necessary to continued growth. At this moment many towns, seeing the great popularity that some of our cities are enjoying through the establishment of well-conducted zoological gardens, are endeavoring to establish similar displays. Because of my capacity as managing head of the St. Louis Zoological Park and also as chairman of the American Association of Zoological Parks and Aquariums, I have gathered proof of the present interest in the creation of zoological institutions from the many inquiries and personal calls I have received whose purpose has been to secure aid in establishing a zoological garden.

It is because of this demand for aid that I am going to give an account of the financial problems which the St. Louis Garden faced when it was in the infancy of its development and the methods of procedure which it followed to overcome these problems. I am stressing the financial side of the question because of the fact that a suitable financial system ranks first in importance among the problems encountered in the satisfactory establishment of a zoological garden.

In 1916 the citizens of St. Louis voted for a tax of two mills on the hundred dollars on all taxable property in the city. The tax amounted to \$180,000.00 the first year and

has since steadily increased each year until last year it amounted to \$260,000.00. In round figures—during the past fifteen years, by means of this continued income, our gardens have received approximately two and one-half million dollars. Half of this has been used for permanent improvements, and half for maintenance. In this way we have built our institution to its present size.

Your first thought may be that an income of \$260,000.00 the amount we received last year, is a bit large. However, when you consider the population of our city this really averages to but twenty-five cents per year per citizen; and when you balance the total amount with the educational, recreational, and general advertising returns which the city has received from the zoological park, you will be assured that the profits outweigh the expenditures.

It has become my firm conviction that a community cannot invest in any other enterprise that will give greater pleasure, or greater educational opportunities and chances for scientific study to its people, or better means for advertising the city, itself. The careful observation of the steady increase in our own attendance and public interest as well as the people and sections represented in this attendance seems to support my belief. From a beginning when scarcely any special display of interest was shown, the number of visitors has increased steadily from year to year. We are being conservative when we say that 2,500,000 people visited our gardens during 1930. Of this number, we can safely state that at least forty per cent were not St. Louisians. This great number of out-of-town visitors had their interest stimulated by newspaper items, international news reels, and also by good-will publicity. Does not this show that the city itself is receiving a great amount of favorable advertising by having an in-

stitution which can attract such numbers of people to its gates?

We functioned smoothly under the financial plan drawn up in 1916 until three years ago, when our management was somewhat disturbed by a problem whose method of solution meant very much to the welfare of our gardens. The present city administration brought up the question of the validity of the two mill tax law. Their movement brought forth a storm of protest. Newspapers and citizens alike joined in the exclamations of disapproval. The zoological backers objected, not to the present administration who had promised to give us enough money for our building and maintenance program, but to the new officials which the complex political situation would bring into office in the future. We would not be certain of the favorable attitude of each new set of city officials. An unfriendly attitude under the plan of city appropriation would leave us high and dry without the proper means of support. Moreover, if we would have been obliged to work under the city appropriation plan, it would have meant that at the end of each fiscal year we would have had to make up a budget based on the amount of money we felt it was necessary for us to have in order to continue the procedure. Other departments, of course, would also present their budgets at the same time. It is not hard to realize that the budgets would total above the city's allotted income. As a consequence, our demands would of necessity have been sliced to the quick, and many planned projects would have had to be abandoned. After a few years of the appropriation method we would have lost the progress we have made, and our zoological garden would have fallen into a most dilapidated rut.

In our defense of the above problem we were greatly aided by the strong zoological organization which is in back of us, and thus we discovered that an interested public is one of the most useful implements for overcoming difficulties. Therefore, I feel that all of you who are interested in new

endeavors should first organize a committee of well-meaning public-spirited citizens who are ready to contribute to the progress of the community, and have them organize a society for the purpose of conducting an educational campaign to sell the project to your citizens. An intelligent, educated public will see the value and possibilities in your enterprise and will help you to further them—an ignorant public will condemn you for an unwise use of money and will hinder your efforts for improvement.

The public will be the foundation of your garden. If you mold and build that foundation firmly, you have prepared the way to accomplish the next step which is to place the matter of an increase in taxation for the establishment of your zoo before your people for their vote. Of course, no matter how firmly you have established your foundation, you will always find a few loud objecting voices which will try to wreck your structure. If, however, you have proceeded along the proper lines; and if you have interested the school board and teachers in its educational value, and the civic bodies and business concerns in its monetary returns, you will discover that the discordant notes will belong to those few who are destined to be against any investment, and that the clear thinking citizens will predominate to carry your venture to success at the polls.

Therefore, before launching your campaign for increased taxation for zoological purposes, it would be wise for your committee to become acquainted with the cost of maintenance and building programs and also the income in those cities which are already operating successful zoological gardens so that you can compare their income with the possible income from taxation in your city. As previously stated, our income of two mills on the one hundred dollar valuation with our population of one million people, means about twenty-five cents per year per citizen. In cities of one hundred thousand or less that ratio would probably be increased. If, after considering your income,

you feel that your garden cannot be placed upon a firm independent financial basis, I would advise you to abandon the idea. By an independent income, I mean one which is assured yearly—one which will enable you to plan for future structures, build those structures soundly, and maintain the whole garden properly from year to year. In some cities bond issues have been floated for the purpose of erecting certain specific buildings. At first this bond issue plan may seem to be good, but after such an experience you will discover that it is difficult to get enough money to maintain the building after it has been erected. I feel confi-

dent, however, that if you will work under the continuous yearly taxation plan, you will feel more than satisfied with the results.

The financial end of the work is not the sole problem which zoological workers have to meet. Serious thought and study must also be given to the plan according to which the proposed organization will function. The management, the general type of the buildings, and the jurisdiction, are items which must be given careful consideration. However, it should be obvious that if there is stability in finance, future prosperity will be assured.

ZOOLOGICAL COLLECTIONS IN MINNEAPOLIS PARKS

From the 1930 Annual Report of Theodore Wirth, Superintendent of Parks

Prior to the spring of 1906, the Board maintained at Minnehaha State Park a few wild animals in small cages, such as are used by traveling menageries, having acquired the collection from a stranded circus. Upon receiving my report that the animals were improperly housed, the Board disposed of them on my recommendation.

On December 1, 1906, R. F. Jones acquired the grounds at the southwest corner of Minnehaha Parkway and Hiawatha Avenue, where he established as good a collection of wild animals for exhibition and training purposes as it was possible to house on that five-acre tract of partially wooded land. This establishment he named "Longfellow Gardens."

In 1923 a strong movement was started, originating in the surrounding or adjacent district, to have the gardens removed, because the people of that locality objected to the noise and offensive odor emanating from the animals. The Board was urged to acquire the grounds by condemnation for playground purposes. Such proceedings

were instituted, but the appraisers appointed could not agree upon a value and brought in majority and minority reports of \$100,000.00 and \$71,700.00 respectively. At this point in the proceedings, Mr. Jones was induced to deed the grounds to the city as a gift for park purposes, with the provision that he or his heirs be permitted to continue to conduct the zoological gardens under a ten-year lease. Mr. Jones very graciously consented to such an arrangement, and the Board accepted the proposition.

Mr. Jones died on November 15, 1930, and the city may well hold him in grateful memory. He was a great admirer of the poet, Longfellow, and his works, and a lover of children and all nature.

Zoological collections are educational, instructive and entertaining, and are well worth the cost of labor and money involved, if properly built and maintained. Up to the present time, I have not seen my way clear to suggest that the Board undertake the establishment of a zoological park of the proportions commensurate to the size of our

city and population and which would afford the animals the housing, treatment, food, facilities, and surroundings to which they are entitled.

I have always felt that the right to and pleasures of freedom must be longed for by animals born or kept in captivity, and even though we give them in return for their life in prison all of the comforts, care, and even luxuries—some of which they could not themselves obtain, we are still cruel to them in depriving them of their freedom. I believe that death is preferable to many captive animals than the life to which they are condemned under our most benevolent and kind treatment.

I have often thought that specimens of all the animals kept in our zoos could be shown in our museums of natural history in cleverly-imitated natural surroundings, so nearly life-like as to give to the general public all necessary information of practical value regarding those animals. Such exhibits can be effectively housed in much smaller space than is necessary with the live animals, which require ample space for exercise. The cost of acquisition, housing, and maintenance of such a natural exhibit is much smaller than the creation and upkeep of a zoological garden.

I am not opposed to a properly-equipped and maintained zoo, such as those operated in some of our larger cities, but I do claim that there is no justification for nor credit to any city, large or small, in maintaining such an establishment unless the quarters for the animals are large enough, their food appropriate and ample, and their general treatment humane to the highest degree. I know of many so-called zoos throughout our broad land that cannot pass that test.

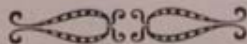
This explanation of my views on the subject is being given because of my failure to

advocate the establishing of a zoo in our park system before this time, and I also felt that we were in need of other improvements of greater importance and usefulness that should be provided first.

In most, if not all, cities which have creditable zoological parks, there is a zoological society which assists the city with funds obtained from membership fees, as well as donations of animals and funds, and also takes an active part and interest in the management of the establishment.

The heirs of Mr. Jones still have four years left of the unexpired lease, and if Minneapolis wants a zoo worthy of its name, it should be possible to carry out the plans which Mr. Jones so fondly cherished for many years, namely, the establishment of such a society and the procuring of funds and an especial zoological park levy to acquire and maintain a zoo on about a 50-acre tract. The cost of acquisition, improvements, and equipment would be about \$350,000.00 to \$400,000.00, and the establishment would call for an annual maintenance expenditure of approximately \$30,000.00 to \$40,000.00.

There seems to be no good reason why Minneapolis, the happy owner of one of the most comprehensive park systems of the country, should not add to its possessions a zoological garden befitting its justified high standing in municipal park and recreation fields, but there is every reason why it should not undertake to do so without means and without legitimate powers to establish and maintain the animals in a practicable and creditable way from the very beginning. No park superintendent or architect should undertake the planning of a zoological park without the advice of qualified experts, who know all about the habits and needs of the animals to be kept in a zoo.



VALUE OF A ZOOLOGICAL SOCIETY

By ALFRED D. LUEHRMANN, *St. Louis, Mo.*

I firmly believe the words "Zoological Society" and "Zoological Garden" are synonymous as they are so closely related, and should always be thought of together.

The question "What Value is a Zoological Society to a Zoological Garden?" I have heard discussed and asked many times. To my mind a zoological society in connection with a zoological garden leads up a great many avenues for the success of a zoological garden, to a community—I, therefore, firmly believe that every city that has a zoological garden should and must have a zoological society made up of its citizens to function with the officials of the garden—and it, therefore, behooves every citizen to be a permanent member of this society. I want to impress this last statement that every citizen be a permanent member and he should see to it and use his or her influence to see that his neighbor and his or her friends become a member of this society. This brings us up to the question "The Value of a Zoological Society to a Zoological Garden." My answers to the question are as follows:

1. Because no matter how small the investment or donation that you make to the zoological garden, as a member of the society you at once begin to take more interest in the garden and in the up-building of it and in the stocking of it with animals.

2. Because as a member of the society you will take friends and visitors out to see your zoo, and those animals which you may have donated, because it is your zoo, paid for out of taxes, and the words of praise and comment given out by you and your friends at the time lend encouragement to the management for a greater and better zoo,—and will increase the daily attendance.

3. Because when you as a citizen are a member of the zoological society you are constantly reminded by bulletins and other

announcements sent out by the society of what is going on at the zoo. This bulletin would not come to you unless you were a member of the society. This bulletin will serve to keep up your interest and cause you to take your children to the zoo in the sunshine and fresh air which will do all of you good. And right here let me impress on you the fact, that the management of the zoo has *no* funds for the publishing of bulletins and sending out announcements and there is where the society can function to a tremendously beneficial extent.

4. There are many times when your zoo is building its housing quarters and planning for improvements, that funds are not available for minor items. If brought to the attention of the society through its management, personal donations can be secured by the society, or if the society has plenty of funds and the amount is not too large, the society itself can donate. Let us suppose a bond issue is necessary—how big it will go over at the polls when the zoological society puts its O. K. on it. In fact the society can manage the campaign. Is this not a big help for the society to render its city and the city officials?

5. There are many times when orphan children or the children in certain congested and poor districts would like to go to the zoological garden under the guidance of a man or a body of men, who know the zoological garden and all its animals, but they have no way of getting there. This is where the society can be of great assistance by furnishing a bus to take them there and arrange with the officials of the garden to have the curator or some member of the staff teaching and explaining to them—getting the children to study and think, giving higher and better thoughts and after a trip of this kind getting their school teachers to talk to them in class about things they saw on their visit to the garden, all of which

will make them better men and women and, after all, better citizens. What a help the society can in this way be to the community at large. But this takes money and dues are necessary so that the society can function properly and this is why I said "every citizen should be a member of the society."

6. As your society grows, your funds will warrant the erection of an administration building at the zoo. This I am sure would help to bring the members of the society and the management of the zoological garden closer together and they both would soon learn that they are fighting for the same cause which is for a better and greater zoo. As I have said before, there are things that the society can do which the management of the zoo can not and it therefore requires the close coöperation of both parties to get the best out of the zoological garden for the benefit of the community at large.

This administration building should be built with a small auditorium where you could have lectures and show pictures of animals of your own zoo as well as abroad. The society should purchase such films as the ones made by Mr. Ditmars of New York and invite members of the society to see them at a meeting having one of the curators or the director of the zoological gardens to talk on the subject shown.

A news stand should also be maintained in the auditorium where postal cards and booklets as well as bulletins of the garden can be sold, and it would not be amiss to have photographs of the zoological gardens in other cities on display so that the members of the society and citizens who are not members of the society can see what other cities are doing to build up their zoological gardens. Classes of Boy Scouts can be started and regular lectures given on snakes and other animals that they would come in contact with when they are out in the woods and mountains, and should anyone be unfortunate enough to be bitten by a snake or other animal, they can be taught how serums, supplied by the society could be administered to counteract the poison.

7. This zoological society should be strictly non-partisan and not affiliated with any political party. This will serve to protect the zoo management from frequent and unfortunate political changes. The longer a director or curator or an attendant remains with a zoo the better for the zoo and its animal inhabitants.

In St. Louis we have a society with a membership of several thousand and this organization has been active and is a going concern, solely responsible for the enactment of our present enabling act and mill tax revenue, making the present healthy condition of the St. Louis Zoological Park possible.

We are frequently asked, "Why do you continue on, you have accomplished your purpose, we now have a fine zoological park, well managed and doing all that was expected?" Yes, that is true, everything is running smoothly in the garden, constant progress is being made, but it was only two years ago that an effort was made by the city political authorities, through their legislative body, to undo the law, sanctioned by our citizenship, making the zoological gardens possible, thereby trying to throw the revenue direct into the city treasury and placing the organization and its activities solely within power of the city's direct activities. But here is where the zoological society functioned. Its whole resources and influences were immediately thrown into the breach, with the result that the court ruled adversely to the City, and people interested in preserving the present system of operation of their Zoological Garden were sustained.

Without the aid and influence of this vast organization, I seriously question whether this would have been possible. Now this or other questions involving the safeguard of the plan may come up again. Therefore, a healthy going zoological society constantly safeguarding the interests, is a power that is bound to command respect, and should be supported by every citizen of St. Louis with a one hundred per cent membership.

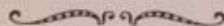
This reason in itself is sufficient justification for the continuous activity of a society, but there are many other motives. For instance, a society well managed and commanding respect from the citizenship of the community can be the means of encouraging endowment funds for the future perpetuation of zoological activities, which naturally would not be made to the city direct. A shining example of this is the large fund now at the command of the New York Society, which, I understand, runs close to five millions of dollars. Philadelphia also has a large amount in its control. Unfortunately in St. Louis, up to this time, we have received no funds in this manner, but undoubtedly it will be done by some of our wealthy citizens.

Scientific collecting expeditions can also

be worked up, an expenditure which undoubtedly would be subject to criticism if financed direct through the annual appropriation.

Through the society, donations can also be made for the purchase of animals. This should be encouraged for the reason that it is an added incentive to others to do the same. It also makes the donor a booster for the garden, as the individual is proud to see his or her name prominently displayed on the identification labels.

In the zoological society bulletin there can be published interesting happenings and scientific and educational data, which greatly increases interest and also gives the children a clearer inroad on the happenings in the garden. City functioning bodies rarely have money for this sort of expenditure.



ZOOLOGICAL PARKS IN SMALLER CITIES

*Paper read by GILMORE M. HAYNIE, Executive Secretary, Park Department,
Evansville, Ind., before Annual Meeting of American Association of
Zoological Parks and Aquariums, St. Louis, October 1, 1930*

We are living today in a highly competitive age. Salesmanship is more keenly appreciated than at any time in the world's history. Upon careful analysis we find that in every walk of life, man, consciously or unconsciously, employs salesmanship in some form or other. Even school teachers, ministers, and politicians, to be successful, must be master salesmen. And now cities, large and small, eagerly seize every proposition which is advanced as a medium to augment their campaign of selling their city to the people about them.

It was this motive that prompted a handful of men in my home town of Evansville, Indiana, a fairly representative city of 100,000 people, to establish a municipal zoological park. Evansville was not getting the recognition, the trade, the good will or the travel we should reasonably expect from the people living in the contiguous territory

of a hundred miles about us, for we had lost sight of the greatest civic fundamental—we had failed to make Evansville attractive to the people in the trade territory rightfully ours, and consequently they looked elsewhere for their entertainment. When we lost their occasional little holiday jaunts, our merchants lost the money they would have left in the town. But worse still, Evansville as a whole slowly began losing its prestige in our natural trade territory. The slogan we had for years heralded to the world—"Evansville, The Metropolis of the Tri-State" was fast becoming meaningless. In fact, smiles frequently played upon the faces of our neighbors when we enthusiastically so referred to the old town.

These things prompted our municipal zoo, and when I state to you that we went at the thing with serious misgivings, I am not overstating the facts. Everywhere we went,

to most every one with whom we talked, there was one great cry—the staggering cost. How could a city the size of Evansville afford to maintain a creditable zoo? Were we crazy? Did we want to bankrupt the city, etc., until I found myself avoiding even social gatherings, jumping every time the 'phone rang, in fact walking through alleys to avoid that contact. Something had to be done quickly. We accordingly got together our handful of zoo boosters and formed the Evansville Zoological Society. We strove for quality and not quantity in its membership. We secured the coöperation of all three local newspapers and through Karl Kae Knecht, the beloved cartoonist on the Evansville Courier, a morning paper with the largest out-of-town circulation, a fund was started to purchase, by public subscription, an elephant for the Evansville Zoo. We thought it advisable to get the biggest and most expensive animal first. Through the untiring efforts of Cartoonist Knecht, the fund began to come in. Slowly, oh, so slowly. Then the school kids took hold, and inspired by Knecht's publicity, the fur began to fly. Surprisingly large amounts began to arrive. The other local newspapers sensed the growing popularity of the thing and started commenting upon and boosting the movement. The trade unions, lodges, luncheon clubs, Sunday schools—everybody got into the spirit of the thing and long before the pre-arranged closing date of the drive, the fund was oversubscribed. Over four thousand dollars reposed in the bank—more money than was needed to pay the bills, and still the subscriptions came in. It was hard to start but harder to stop.

Then the most difficult end arrived, that of holding the intense interest that had been aroused. The newspapers did a master job. A little female elephant, then in India was purchased from the Hagenbecks. She had to be named. A spirited and prolonged newspaper contest produced the name of "Kay" in honor of Cartoonist Knecht. Soon Kay was started on her trip to Evansville, via Hamburg, Germany. Every day front

page stories appeared in the local papers—some of them manufactured from the nimble brains of enthusiastic reporters. The Hagenbecks forwarded cuts of the animal and human interest bits about her. These were used and reused by shrewd advertisers. The question on every school kid's tongue was—when will Kay arrive? Soon the grown-ups became anxious, too, and before long the elephant's arrival was the one big topic of conversation. The managing editors of the newspapers were throwing their hearts and souls into their publicity and one day the big news broke. Kay had been secretly shipped from Hamburg and had arrived at the port of Boston. She would arrive in Evansville in four days. The mayor got into the spirit of the thing and declared Elephant Arrival Day a holiday. The school board fell in line and declared no school for the grades and then accepted Cartoonist Knecht's suggestion that the grade schools as a body turn out in a parade. The police and fire departments did likewise. Then somebody suggested a float or two, and within twenty-four hours elephant headquarters had twenty-one merchants and manufacturers signed up for parade floats. The retail merchants association saw the possibilities and urged their members to put on special sales with values that would attract the tri-state buying public. The next day the newspapers were heralding great advertising spreads calling attention to the real bargains available in Evansville on Elephant Arrival Day.

To make a long story shorter, the morning of the parade arrived. By 8:30 o'clock downtown parking facilities were choked with out-of-town cars. The streets in the line of march were packed with people. But one other time in the history of Evansville had such a crowd congregated. And then the parade. It couldn't have been better. Attended by one representative of each school and the Boy Scout troop, the little elephant, bespangled with glittering trappings perched upon a lofty float, brought up the rear as a perfect climax. Kay had

created a new era for Evansville. The merchants were thrilled by their exceptionally fine business, the cafes and eating places reported they had never done as well and the theaters brought out their standing-room-only signs for a change. Everybody was happy. Evansville was coming back into its own.

Striking while the iron was red, the zoological society immediately requested the board of park commissioners to petition the common council for an appropriation of fifty thousand dollars with which to build a combination elephant, cat and small mammal house. The request was granted without a dissenting vote and Evansville was on its way to a zoological park. The park board then, at the request of the zoological society, immediately set aside perpetually for zoo purposes a splendidly located beautiful tract of forty acres—a part of the most popular and largest of our city parks.

All this took place a year and a half ago. Now, in addition to the elephant we have lions, tigers, leopards, pumas, ocelots, llamas, sasin antelope, auodad, elk, buffalo, deer, bear, sea lions, an eighteen foot python, other smaller snakes, seven species of monkeys and baboons, a beautiful water-fowl lake well stocked with swans, ducks and geese of various kinds, a long list of smaller mammals and birds and each and every animal, bird and reptile has been donated. Our problem now is to gracefully reject specimens not practical, for one reason or another, for us to accept. The reason for all this generosity upon the part of our citizens is that not only do all our newspapers give widespread publicity to the donations, but we also provide at the cages quite handsome metal signs carrying the donor's names in generous proportions. Our shrewdest local advertisers have discovered that these signs at the cages supply for them a very effective and inexpensive form of publicity which they would not care to be without.

To keep our maintenance expense down, we are, I freely admit, doing some things

not considered the best practice by directors of the larger zoos. For instance, we buy and keep on pasture sound old horses for cat food. These horses have averaged us thus far nine dollars per head gross, but after sale of the hides, bones, etc., less than six dollars per horse. As we use about five horses each month our carnivorous animals cost us less than thirty dollars for that period. Last season we substituted cornstalk fodder as roughage for our elephant and she did very nicely upon it. Subsequently, through an arrangement we have made with the municipal airport board, we raise at the flying field, alfalfa, timothy and clover hay, in quantities far exceeding our demands. By this arrangement the airport fields are in good shape at all times for emergency landings off the runways and the excess hay we sell to other departments of the city brings down the cost of feeding our hay eaters at a very low figure. We have a large two-wheel cart to which we hitched our elephant, thus riding large numbers of children. For these rides we charge ten cents. Out of this fund we have engaged an expert elephant trainer who has worked our elephant and llama into a very creditable double act, which is shown every afternoon at 3:30. It is really amazing how very popular this act has become and it is our intention, next year, to also work our sea lions and monkeys.

In our zoo expansion we are counting very heavily upon the various luncheon clubs. The Kiwanis Club of Evansville started the ball rolling this year by supplying all the necessary money for erecting a very attractive brick and concrete drinking fountain house equipped with six sanitary drinking fountains of various sizes, the water of which is ideally cooled with a large mechanical refrigerating unit. Another luncheon club has just about completed all arrangements to provide our zoo with a very creditable bird house. As the ice is broken we feel confident other gifts of this nature will follow as needed.

A source of revenue for the zoo we shall have next year is the amusement concession.

Amusement parks over the entire country are having a very hard time to exist. Evansville is no exception and one of the reasons for the failure of our particular amusement park is our zoo itself. No one knows this better than the amusement park manager. We are therefore leasing to our largest and finest amusement park a segregated tract of park acreage located next to our zoo. The amusement people will move all their rides and other concessions there. Our arrangement with them provides no gate charge, no dance hall or other undesirable privileges. By reason of the proximity of their tract to the zoo with its large daily attendance, they are agreeable to giving the park department thirty-five per cent of their gross revenue for the privilege. Based upon their last year's gross business the park department would have secured as their percentage approximately twenty thousand dollars. This should be greatly increased next year by reason of better location and much larger crowds to draw from. With this additional money

coming into the zoo department our municipal zoo should be more than self-sustaining.

It may be of interest to some present, to know that the maintenance and operating cost of our zoo last year was considerably less than the loss we incurred in the park department in operating our eighteen-hole municipal golf course; and the records further show that the best one-day attendance during that year at the links was 431 persons, whereas it is not unusual for the zoo to have a Sunday attendance of from three to five thousand people, a great percentage of whom are most desirable visitors from our trading area. By this statement I do not wish you to gain the impression that I am opposed to our municipal links. I am not. It is serving a very necessary purpose and filling an important need. I merely use the comparison constructively to show that any city that can maintain a really good municipal links can afford and should have, as a matter of good business, a zoo as good or better than the one I have described.

THE EDUCATIONAL DUTY OF THE ZOOLOGICAL PARK

Paper by ROGER CONANT, Educational Director, Toledo Zoological Society, before Annual Meeting of American Association of Zoological Parks and Aquariums at St. Louis, October 1, 1930

The city equipped with a modern zoological park is fortunate, for in addition to serving as a constant source of interest and entertainment for everyone, the zoo can and should be an educational fount as well. The advantage gained by studying and observing wild life alive, even though but for a short time, far surpasses the information which the average person may absorb by lengthy studies of books, photographs or mounted specimens.

Unfortunately, however, most educational institutions are apt to be slow in making use of the opportunities offered at the zoo. Influenced by the actions of not over courteous

keepers or the exaggerated yarns of side-show men, many teachers and professors are backward about coming to the zoo for information. In almost every case it falls upon the staff of the zoological park to make the first advances. By the inauguration of an educational program much can be done to establish excellent relationships with local institutions of learning; such a program, if undertaken in the right way, can be of great value from the standpoint of publicity and propaganda as well as that of education.

The man responsible for this work should be one who has a broad general knowledge of all zoological branches, rather than one

who may have specialized in one group and neglected the others. In many cases the director of the zoo might well be the one qualified to do this work provided he is not already loaded down with executive duties.

There are many ways in which the zoo may serve in an educational capacity, and in the zoological park itself excellent opportunities present themselves. Accurate and easily visible signs stating the common and scientific names and giving a brief description of each animal shown are absolutely essential in a first class zoo. The director should insist that all signs be changed when animals are moved in order to avoid confusion and misunderstanding on the part of the public. A collection of animals rich in species and well labeled does much to teach a true understanding of zoological classification and comparison.

Except in special cases all animals should be fed in full view of the public, giving the latter a chance to observe upon what, and in what manner, the various species feed. The zoo which makes an event out of its feeding activities will find that its attendance will be greatly increased.

One of the most excellent ways in which popular education may be developed is by the conducting of school and university classes through the zoo. A number of problems arise when this plan is attempted and these problems must be settled in the individual park. Whenever possible the guide employed should be able to give a running account of the more interesting and important animals visited, using perhaps as the basis of his talk some general subject, as the comparison of the manner in which the teeth and general structure of each animal are adapted for securing its food. Another basic subject might be geography, naming the continent from which the various species come.

Much depends upon the individual guide and experiments must be made before the correct results can be obtained. It should be kept in mind that the purpose of the talk

is educational, and the tour of the zoo should never be reduced to a friendly chat between guide and teacher while the children lag behind. The age and grade of the youngsters should be a paramount factor to remember in giving these talks.

Experience will show how many visitors the guide can handle. Small parties are always more successful, particularly with grade and high school students; university groups may be larger. Much depends likewise on the types of children or people represented in the audience.

In zoos which charge admission to the grounds the educational program is greatly helped by issuing free passes to students visiting the park in a body accompanied by teacher or professor.

From a scientific standpoint the zoological park has a fine opportunity to offer assistance. All of the rarer animals should be carefully preserved and mounted when they die. Strong natural history organizations exist in many cities and usually such organizations are eager to secure dead animals which they can prepare and add to their museums. The American Museum of Natural History, the Philadelphia Academy of Natural Sciences and the United States National Museum for example, have secured a great deal of valuable material from the zoos located in their respective cities. In cases where there is no large museum, a chance is afforded to establish one in the zoo itself.

The ways in which the educational program may be developed are very many, far too many to mention in a short paper. Local circumstances will dictate how the work should go. A few additional methods of creating popular interest and putting education across are suggested:

1. An exhibition of trained wild animals.
2. The establishment of a scientific experimental laboratory in the zoo.
3. Showing moving pictures that have been taken in the zoo. This work is very effective when pictures are shown

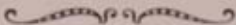
to school and university classes in their own buildings.

4. Conducting courses in the zoo on popular zoology.
5. Publishing periodical popular accounts on the groups of animals represented in the zoo.

In many cases the educational work may not be stressed until building programs are well along. When the houses of the zoo are completed and the collection of animals

reaches capacity limits the value of an intensive educational development is vastly increased. Popular interest will fall off when there is no longer anything new at the zoo to attract attention and newspaper publicity. It is then that the educational program will give life and pep to a park that otherwise might go stale.

It is our duty—both to our communities and to ourselves—to educate our public into really knowing our animals.



PARK ECONOMY

Paper by CHARLES J. RENNER, Engineer, New York Zoological Park, read at Annual Meeting of American Association of Zoological Parks and Aquariums, St. Louis, October 1, 1930

The object of this paper is to discuss the economy connected with parks in general, with particular regard to those parks owned by or delegated to the use of the public. Though parks, to many people, represent only a place in the neighborhood where one may go, and sometimes an unprepossessing place at that, yet there always will be found in them people who enjoy some measure of their benefits and pleasure, unkempt though the park may be. The visitor, if he studies carefully, cannot fail to discover that something has been bestowed upon and given to the users and to himself, which satisfies a latent feeling of necessity. It might be the quiet, the children playing, the sight of green trees, the birds, the flowers, or perhaps simply the open space and sunshine that somehow bring freedom and relief to the mind and soul.

If we could hark back to the beginning of civilization we should find that men were for tens of thousands of years roaming the earth in freedom, filled with desires and instincts all intimately connected with the open spaces, the green trees, the brooks and the flowers, and that they were forced to garner their existence from hunting and fishing, and from fruits and herbs, all in a very wild state.

To them all joys and sorrows were directly connected with the land. As civilization progressed and men formed in groups as tribes and clans, to become shepherds or farmers, the land retained its predominant place as the best source of all living, and the surest and best inducement toward happiness and freedom. All human occupations and associations continued to be directly connected to the soil or bound together with the outstanding features of nature. Though everybody was still free to listen to the birds and to roam among the flowers, yet slowly a new factor of toil for others entered into men's lives and with this came restrictions and distinctions. Gradually only a privileged few were permitted the freedom of the open spaces. Hunting became a sport and fishing a recreation. Later, when the clans banded and mankind became more numerous, with families, towns and cities established, there were created, through necessity, occupations not directly connected with the land. The distinctions between those who toiled and those who did not became sharper and the hunting and the open spaces became the privilege and property of only the great and prominent. Yet the masses who were cut off maintained a steady craving for space

together with good morale. With common labor and seasonable workers less care need be bestowed, for often the parks may be used as an instrument to relieve distress and suffering among the needy by furnishing employment to those who are economically unable to maintain themselves and families in the factories and shops, or through misfortune and depressions. A well trained personnel can and should do the ordinary work more substantially than contractors but large and special operation may be contracted for, especially when they require experience and equipment not ordinarily within the park. To conclude, the organization should maintain a true spirit of loyalty and efficiency as with any other enterprise and all who work therein must keep in mind the reason for the park's existence, constantly striving to make it of better service to the contentment of the people.

BUILDINGS AND MONUMENTS

Another matter which occupies a great deal of attention is the stress often laid upon the need of fine architecture in buildings and monuments set in public parks. There is no doubt that the best and most substantial class of both are a delight to those who love the fine arts, so where they can be used it is well. Yet, strict attention should be given to properly balanced settings and also to whether or not the park can do without them. The buildings, to be justified, must satisfy a need or be a source of gratification to the people at large, as well as their sponsors. Yet, any building in any park should be made artistic and fit in. There is much difference of opinion of just what is artistic and there are many forms of architecture. It is good economy therefore to consult the best minds of the community as to the original design and then to make subsequent work similar in order to maintain the distinctiveness and individuality of a park. The same may be said of the landscaping and of the engineering. Well meaning people can serve no better purpose than to donate or bequeath some part of their wealth to the parks, even though it is the duty of the

commonwealth to maintain and be responsible for public works.

One important thing so far as park economy is concerned is that all such money should be left free for disposition by the authorities as they see fit. Too often we find expensive memorials, the result of some one person's ideas, which have become a burden. The parks could use the equivalent generally to better advantage. More appropriate buildings, pensions for old age, steadier work to the personnel, or easier conditions to the masses who use the parks can mean more for contentment than too many monuments. It must not be assumed that all donors have not used judgment, for if we inquire into the beginning of many parks we will find that donations and bequests were the root of their creation and that they were conceived by some real and farseeing philanthropist, or are the result of the efforts of some great public official, as was recently the case in New York State. Whether or not a park is needed or can help a community can be ascertained by observing the popularity of similar parks in other localities. Whether or not its aim is correct in being chosen against the objectives of other parks may be determined by the number of people it will serve and the relative costs. Expensive parks for the pleasure of a few are not justified unless important considerations that contribute to the preservation of the people or welfare of the nation are preponderantly the cause of their making. These may be the result of other economies.

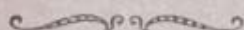
CONFLICTING ECONOMIES

With the increasing population there are other economies constantly in competition with that of the parks and in some cases they may be combined to the mutual advantage of each as they grow. It must be remembered that every new person makes necessary an additional part of the land for food and water, from an inelastic and stationary reserve. These needs being those of life itself, and vital, may force the water supply, for instance, to encroach upon the parks.

The effect is to isolate and close off certain of park lands as watersheds and thus diminish park areas. Where such economies conflict, the parks must give way or combine, but in no case need a park give up its essential lands to be used for distribution systems which can be placed equally well upon other ground, except where the waterworks will enhance the beauty and serenity of the landscape. And in recent years the industries have become large factors in the competition with their demand for water and water power. Very often there need be no interference with the parks except to those who are aesthetically inclined, especially where the land is needed for power purposes. Here, essentially it is necessary to change some primitive landmark. A waterfall or a river bed is entirely altered and a portion of a river is devoid of water altogether in dry seasons, yet many charming lakes may be created in return. Again, sewers, and industrial wastes may pollute streams and kill the fish or become offensive. Though park advocates may battle these conditions heroically, they must remember that after all they are combating the onward march of other economies essential to the people under the present civilization, and that finally, after careful studies of the importance of each, they

must compromise before the same authorities and make the most of it. It does not follow from this that the public and the park proponents should stand aside and see every stock jobbing enterprise projected to make a profit for banking syndicates carried through when no real need really exists, or a beautiful waterfall added to some public utility chain for the benefit of remote users of power and still more remote stockholders. The balance must always be governed by the real service and contentment to all the people.

To sum up it must be understood that all of the foregoing is not given as indisputable fact. No doubt there are many present who cannot agree with all that has been said, and perhaps with good reason. Special cases may not have worked out. But it is hoped that the paper has given enough to show the need of parks and their importance; also that their functions are not matters of money consideration, but are to be measured in general welfare to the people. In all they are a counteracting force against the fatigue set up by massing populations and industry and no price is too great for their expansion and improvement in order that they shall keep up with the progress of the rest of the nation.



WHY A ZOO?

From November "Zoonooz," Published by Zoological Society of San Diego.

BELLE J. BENCHLEY, Manager and Executive Secretary

"Just what does the Zoological Garden offer the lover of nature that cannot be found in nature itself?" or "What good is a zoo?" are frequent queries made to those engaged in such work by persons who have not made close contacts with the work. Most of the people who come to the zoo in San Diego come, it is true, to be amused, some few to criticise, and most of the rest to acquire knowledge or information upon some creature or some phase of animal life

that they are especially interested in. In spite of the objects of the visit it is safe to say that no one comes to the zoo who is not to a certain degree entertained and who does not add to his fund of natural history in some particular instance even unintentionally.

Persons watching the animals with little or no interest of a scientific nature will be heard to say, "Look at that. I never knew there was anything like that in the world,"

or "Well, I never saw turtles eat lettuce or bananas before. I thought they always stayed in the water and ate meat." The feed provided the birds, animals, and reptiles seems to furnish the greatest fund of new information. Most people look upon all wild animals except deer as carnivorous and are simple amazed at the amount of fruit, vegetables, and grain provided for the great majority of the captive creatures. Another false conception of many of the visitors to the zoo is the quality of food animals require. Apparently they look upon all wild beasts as careless of their choice of food or as scavengers by choice. They are surprised at the quality of food given and more amazed as they watch the animals select the choicest morsels first, carefully peel their carrots and potatoes with their teeth and pick over their stale bread eating first the inside.

All of these things can be learned from books but how much more impressive to acquire such facts from the observation of the living creature. Persons who have the opportunity of wide travel perhaps have the most real appreciation of a good zoo and usually visit zoos at every opportunity. Those who have had the chance to see and study birds and animals in the wild also enjoy greatly the closer study afforded by a zoological collection to which they may return frequently for extensive observation and detailed study. But it is the great majority of persons who have no chance for extensive travel and only short vacations in which to get back to nature that the zoological collection furnishes with most of the natural history they ever acquire from first hand observation.

Lucky indeed the person who happens upon the rare sight of a snake changing its skin or a mother bird feeding her nestling in nature, but to observe such phenomena close at hand is an every day occurrence in a zoo. Parents will stand and solemnly tell their children that once in every year a snake sheds its skin, and that they must run from all snakes, and then read with

amazement the information cards posted for their benefit. How often does the average individual even though he be a lover of the woods see the graceful movements of a water snake swimming through a clear pool or a beaver at work on a dam? How many persons believe that the tongue of a reptile is its fangs and dodge when they see the forked tongue dart from the mouth of a snake, expecting to have poison sprayed over them?

To the average person who comes to the zoo some of the simplest things in nature are the greatest mysteries largely because their information has chiefly been second hand or founded upon hurried or careless partial observation. A large zoological collection brings the animal creation to the city dweller and the practical uses to which it is put are legion. Schools, scientists, artists, advertisers, journalists, and agriculturists are recognizing and taking advantage of the opportunities to correlate their interests with the zoo until instead of being considered a luxurious and expensive form of entertainment they are classed with schools, laboratories, and farm bureaus by those who have the handling of public funds.

The office of a zoological garden is an information bureau upon many questions, most of them earnest, serious, and sensible, but not all. The phone rings and the person on the line wants to speak to the director. "No thank you, no one else will do. Well, if she will be at liberty in a few minutes I'll wait. Yes. Is this the manager? Well this is the Continental Loan and Security Office. Say, how long is the tail of a hippopotamus? Well, we had a bet on it and some of them bet it didn't have any tail and one of them said it was seventeen inches long." Or, "Say, we called up to see how long a giraffe's tongue was. One of the fellows claims that it is twenty-five inches long and that the giraffe uses it like an anteater does its tongue." Or perhaps a frantic voice at the other end of the wire on the verge of tears exclaims, "Oh! send someone out to El Cajon right away. There

is an owl in my back yard and it may kill my chickens." "Say, there is a polecat in my attic. How shall I get it out? Well, what is a zoo good for if you don't come out after wild animals?" Again the earnest questioner will want to know if a great big striped black and white snake that darted into the shrubbery is poisonous and you explain that it is a king snake, not only harmless but highly beneficial, and you are met with the flat statement, "Well, all snakes look alike to me and I want you to come right out here and get it. I called the fire department and they said to call the zoo." Another call, and this time a plaintive voice inquires, "Can you tell me what to do with our desert tortoise? We have had it three days and given it fish and flies and everything and it simply won't eat." You explain that they are vegetarians and a little lettuce or fruit or grass will be all the nourishment it needs, but your questioner responds with, "Why I know better. All turtles eat meat."

A most trying use to which the telephone of the zoo is put is by that would-be clever practical joker who after all these years has apparently just heard the joke of giving the zoo number to some innocent office girl with the request that her employer call that number and ask for Mr. Fox or Mrs. Camel. Not only is this silly jest practiced on all fools day when it requires the entire

time of one office girl to answer the telephone, but by spurts all through the year some of these jokesters, forgetting that both of the innocent parties involved are probably extremely busy, leave the call at a dozen or more places in the course of one afternoon. Annoying at any time, it is especially disgusting when the party placing the call in good faith lacks the sense of humor necessary to laugh off the crude joke and berates the innocent clerk answering the telephone for placing such a ridiculous call or refuses to believe that it is anything but a bona fide call asking over and over in louder and louder tones what is this number and what is the matter and who in thunder left such a call if you did not.

The zoo is also the repository of many castoff or troublesome pets. Many lovely birds and cunning monkeys are received in this way, but so many persons bring in pets with all kinds of restrictions attached to them and all sorts of instructions as to their care that if all of the employees in the zoo had only that particular creature to care for it would be too small a force to carry out the rules laid down by the donor. In such cases it is the better part of discretion to insist that the owner take the pet home again as there are already too many on exhibition. But frequently persons bring their pet because they know it will have better care than they could give it.



CONSTRUCTION PROBLEMS IN A ZOOLOGICAL GARDEN

By JOHN E. WALLACE, *Architect, St. Louis Zoological Garden*

The layout of the average zoo is the result of natural growth rather than the result of following a preconceived plan. Consequently, as the institution grows, exhibits are scattered, and those in charge face a serious problem in coordinating the entire exhibit.

It is vitally important that the directing head should inspect other zoos, both for their good features and for their bad ones, before definite plans are decided upon. The time spent in this preliminary work is well spent; plans can be changed with little expense, but it is always costly to change the material things.

In formulating the general plan, one should first determine the type of zoo desired. One has a choice of many types, among which are the geographic groupings, the panoramic views, and the grouping according to kind. One vital feature, in the interest of efficiency, is to have each subdivision under an administrative head grouped as closely as circumstances will allow.

The main sewerage and water systems should receive careful attention. These should be of ample size to take care of future needs, and should be located so as to permit easy connection with future buildings. Other points for serious consideration should be the electric distribution, the intercommunicating telephone system, and the feasibility of a central heating plant.

The various exhibits should not be too crowded; the public, as a rule, come to the zoo for pleasure, and will enjoy the exercise of walking from one exhibit to another as much as they will enjoy looking at the animals. The walks should be of ample size to accommodate the maximum crowds, and as nearly as practicable, should lead the crowds by direct routes. In this connection,

it is well to exclude automobiles from the zoo grounds, both on account of the congestion and on account of the greatly increased danger of accidents. This may be done easily by providing ample parking space either just outside of the grounds or within certain specified boundaries inside the grounds.

The boundary fence should also receive careful consideration. It is, as a rule, not a sightly thing, but it serves many vital purposes. The public can be excluded from the grounds after exhibit buildings are closed, dogs and other animals are kept out, and in case of the escape of an exhibit animal, in most cases, the fence will confine it within the zoo area.

Another problem which will face the directing heads is the question of which exhibit must be the first to be constructed. Local considerations will have much bearing on the final decision, of course, but where the idea is feasible, it would be well to install a temporary exhibit and to watch the reaction of the public. Inasmuch as tastes vary, and some animals have more local popular appeal, the time and small monetary outlay will be found to have been well spent.

The general feeling that a zoo would be a detriment to an established park can easily be offset by careful attention to the architectural beauty of the buildings, by making the building fit the landscape, and by proper planting.

There is no set style for zoological buildings, but for the beauty of the entire zoo, it is probably better to hold to one architectural style. There are many styles from which to choose, among which the English Farm type suggests itself readily, particularly when the zoo is to be located in a park or a wooded area. The design of the building should, to a certain extent, be in

keeping with the animals confined therein. In other words, the design of the elephant house should not suggest the fineness of the bird.

Much interest has been shown in the "barless" dens in recent years. This type of construction lends itself beautifully to a rolling topography. There are many advantages to be found in this type of layout, not the least of which is the clear view of the exhibit presented to the public. The fact that some animals lend themselves to exhibition in the "barless" den much better than others should receive consideration, as well as the fact of the almost prohibitive cost of construction in flat areas. Some of the European zoos, where this type of exhibit is popular, even have elephants on exhibit in the pits.

Another custom, in Europe, is to have the architecture of the building suggest the country from which the animals therein have originated. This idea has not been adopted in the United States for the reason that there can be no general relation of the buildings, and for the reason that the moving of the exhibits from one building to another, which may become necessary at any time, can easily create the wrong impression on the mind of the public.

In planning the individual buildings it is well to remember that we are building for the future. Lack of consideration of this item may find that within a few years the growth of the zoo has made some buildings entirely inadequate for the purposes for which they were erected. It will be found that each new exhibit will not relieve the crowded condition of the older buildings, but will draw the public in increasing numbers.

The plan of each building should receive the utmost consideration. In planning a home for a client, the architect usually tries to conform the house to the client's requirements and mode of life. In this case the client can tell the architect what he wants, but the animal cannot, yet he is forced to live in that house for twenty-four hours a

day. Usually the keeper or the man in charge of the group can give the architect the fixed requirements for the animal. The architect must also remember that the public will be in the house for at least eight hours a day, and make adequate provision for it. From there he has a free rein, and can plan his building as he will. It is well to remember, however, that the ideal arrangement of the building will give the man in charge of the building full view of his charges at all times.

In designing the interiors of the buildings it should be remembered that some types of exhibits lend themselves to the picture better than do others. The reptile, as a rule, is sluggish, so liveliness may be introduced by judicious wall decorations as well as naturalistic backgrounds and settings in the cages. Birds, on the other hand, are usually both active and colorful, so they easily lend themselves to the formation of the picture.

The aisle space in relation to exhibit cages varies for different displays. Some displays are more active, more brilliantly colored, or have a greater popular appeal, all of which considerations call for larger space for the public.

Toilet facilities are probably best distributed if incorporated in each display building. By so doing, their use is only permitted during the times when the building is open to the public, thereby reducing vandalism to the minimum.

Ventilation and heating require careful thought. Experience has shown that better results can be obtained from heated fresh air properly distributed through both cages and public space by the use of ducts and fans, than by the older system of direct radiation. One of the greatest advantages of this system is that it eliminates or greatly lessens the inevitable animal odors to which the public object.

The cages should be large enough to afford the animal exercise. Group cages should be provided when practicable, as the public is usually more interested in the pic-

ture provided than it is in the individual animal.

In some instances outside cages or runways are not required. Here the skylights over each cage can be pivoted so that they may be opened when the weather permits, and the direct sunlight allowed to strike the floor at some period of the day. Opalescent glass partitions allow the borrowing of light from one cage to another, eliminating most of the shadows, yet preventing the animals in adjoining cages from trying to fight through the glass.

An innovation in cage fronts has been successfully installed and operated in our new bird house. Plate glass, with side panels of wire screening or metal grilles is used; the glass to give a clear view of the exhibit, and the grilles to allow ventilation and to permit the public to enjoy the song of the birds. The glass has been pivoted both at top and bottom to allow the keeper to wash both sides of the glass from the front, without entering the cage.

Cage floors should be made of materials which are impervious to water. Rubber flooring has been used successfully for some types of animals, cork brick is also good. A cement floor on a hollow tile base gives a warm floor, overcoming the greatest objection to this type. The intersection of the floor and the cage wall should be made square instead of rounded, as has been the custom, for the square intersection allows the keeper to clean the entire floor with a squeegee.

Water supply and drainage are most essential fixed requirements for cages. Some animals require a large drinking basin,

others are content with a bubble fountain. The floors should be pitched to drains, but too great a slope is not good. A good method of drainage is to allow each cage outlet to discharge into an open concrete gutter at the main floor, with ample pitch to traps. The gutters can be cleaned readily, and the waste will not directly enter the soil pipe, preventing its blocking.

The space beneath raised cages should be closed both front and back, but open from the basement, giving a fine chase-way for water and drainage pipes as well as heating ducts. In this way, the open space beneath the cages, which have been a trap for dirt and a breeding place for vermin, has been eliminated.

The lighting of the modern zoological building has developed importance. Heretofore the cages have been left to their own devices, while the public spaces have been well illuminated. This has been reversed in recent time, the public is left in subdued light, and the lighting of the cages is given great attention. Skylights and electric lights over each cage provide the light, enough of which penetrates the cage and strikes the public space to be adequate.

The monetary outlay necessary for the preliminary survey, as outlined, may be a prohibitive factor to the new zoo in a small community, in which case an architect with practical experience in zoological garden layouts and construction should be consulted. In either case the money will have been well spent, for only the experience of careful and detailed observation or actual construction will prevent the man in charge from falling into many expensive errors.



ZOO CONSTRUCTION PERTAINING TO HEALTH AND FUTURE HANDLING OF EXHIBITS

Paper By EDWARD H. BEAN, *Director Chicago Zoological Park, before the Annual Meeting of the American Association of Zoological Parks and Aquariums.*

Photographs by HUGH S. DAVIS

During the week end at the Detroit Zoological Park, we have seen and no doubt countenanced with appreciation the more interesting and possibly more useful purpose this new conception of a zoological park makes available—available for the better husbandry of the collection and for its more interesting presentation to both the casual visitor and the visitor with some serious intention. The principal device of the conception is the use of the barless cage and the use of all possible details to stimulate a natural background or stage, such as an association of gregarious animals and a reproduction of the habitat scene in both plant material and terrain. We have always been amused at how fantastic this construction has seemed to a few; their opinions and impressions of it, especially when they are unfavorable, have been usually limited to their own experience and their own possessions. Mr. Millen's Detroit endeavor has encouraged others, his work and the work of the Chicago Zoological Society suggest this paper.

The barless cage or enclosure as lately constructed in the States and Europe is not a new idea. The first truly remarkable barless cage was that built by Emperor Maximus in Rome. Not only animal combats were held here, such as the baiting of lion, bear, leopard, elephant, and hippopotamus but the slaughter of barbarians and Roman Christians by animals is better known. The smooth and encircling parapet wall, higher than any of the animals could scale or jump, was the only protection to the gallery of spectators above. Still later, the pit, a smaller barless enclosure, where animals

were kept in by steep smooth walls, was built in many European cities. In these dark cavernous wells bears were usually shown. Similar construction has been copied in this country as late as the past year, I am sorry to say. Like enclosures for the Felidae, particularly leopard, were used in England and Italy for the execution of felons, usually court offenders. Here the accuser in private audience could watch the slaughter from the open gallery above.

It may be seen how quite impossible and unfair it would be to attribute dates and innovations of devices in barless cage construction to certain individuals. It is well known, however, that the first moated cage in the modern manner was built in Zurich, Switzerland, by Ursus Eggenschwieler for lions, animals in his own collection. After some time, he became associated with Carl Hagenbeck in the building of the private park at Stelligen. The interesting idea of associating animals of the same origin was the thought of Hagenbeck. The African scene and Polar panorama for example. This work was completed soon after 1900 and to date no finer rock work has been built and no more ingenious arrangement and association of animals have been accomplished. Yet the plans of Hagenbeck and Eggenschwieler were much ridiculed by their contemporaries and it was not until recently that the employment of their plans have gained favor. The dry moat was used exclusively by Eggenschwieler, since then the water filled moat has come into use and will probably become more extensively used especially in localities with little experience in freezing temperature. Lately one reason-

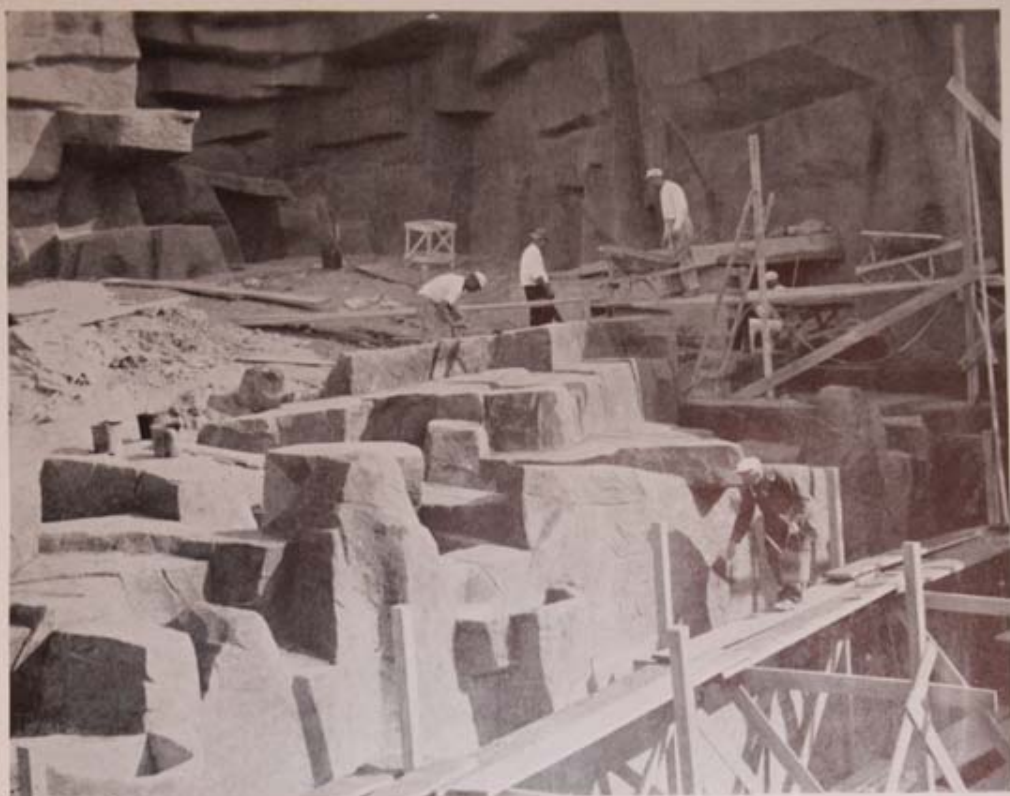


THE BARLESS BEAR ENCLOSURES AT THE CHICAGO ZOOLOGICAL PARK ARE NEARING COMPLETION

able and general objection to the barless cage has been removed; Carl Reisinger, architect for the Dusseldorf Garden, has constructed a barless cage for the great apes in which they may be viewed from a distance of about eight feet. A moat for a barrier is not used in this arrangement, and yet the visitor has an unobstructed view of the animals. In the foreground of the cage and counter-sunk in the floor is a copper plate, this extending the full width of the cage. Parallel to the plate, and strung taut and horizontally from one cage partition wall to the other, are four or five number eight gauge copper wires on twelve inch centers. Both plate and wires are charged with direct current and should the captive animal attempt to escape any manner of doing so would necessitate his touching both plate and wire and the circuit is then closed. The experience of the first shock, we are told, is usually remembered and only on one occasion was the experiment repeated. This device has been patented by Reisinger and although arrangements for its use may be made, park men, even in Europe where it could be studied, are reluctant to use it. Certain mechanical defects are at once apparent and there is always the possibility of the failure of the electric current. Current failure has been somewhat removed, however, by the use of wet cells.

Although many of us here are quite enthused in possibilities of the barless cage and are building after this style, nevertheless there are many just criticisms of the idea, especially in the limitations it enforces because of its great cost. I shall enumerate some of them later on and at the same time offer in a cautious way some suggestions for improvement or at least for minimizing or discrediting certain criticisms, especially as to cost.

Barless cages have been built for animals of nearly every motive, habit, agility and strength. With ingenuity there is probably no form that could not be detained and shown in them. There is great opportunity for originality in constructing them. There has been little attempt to group social animals as Hagenbeck has done; Heinz Heck at Munich is very forward in this experi-

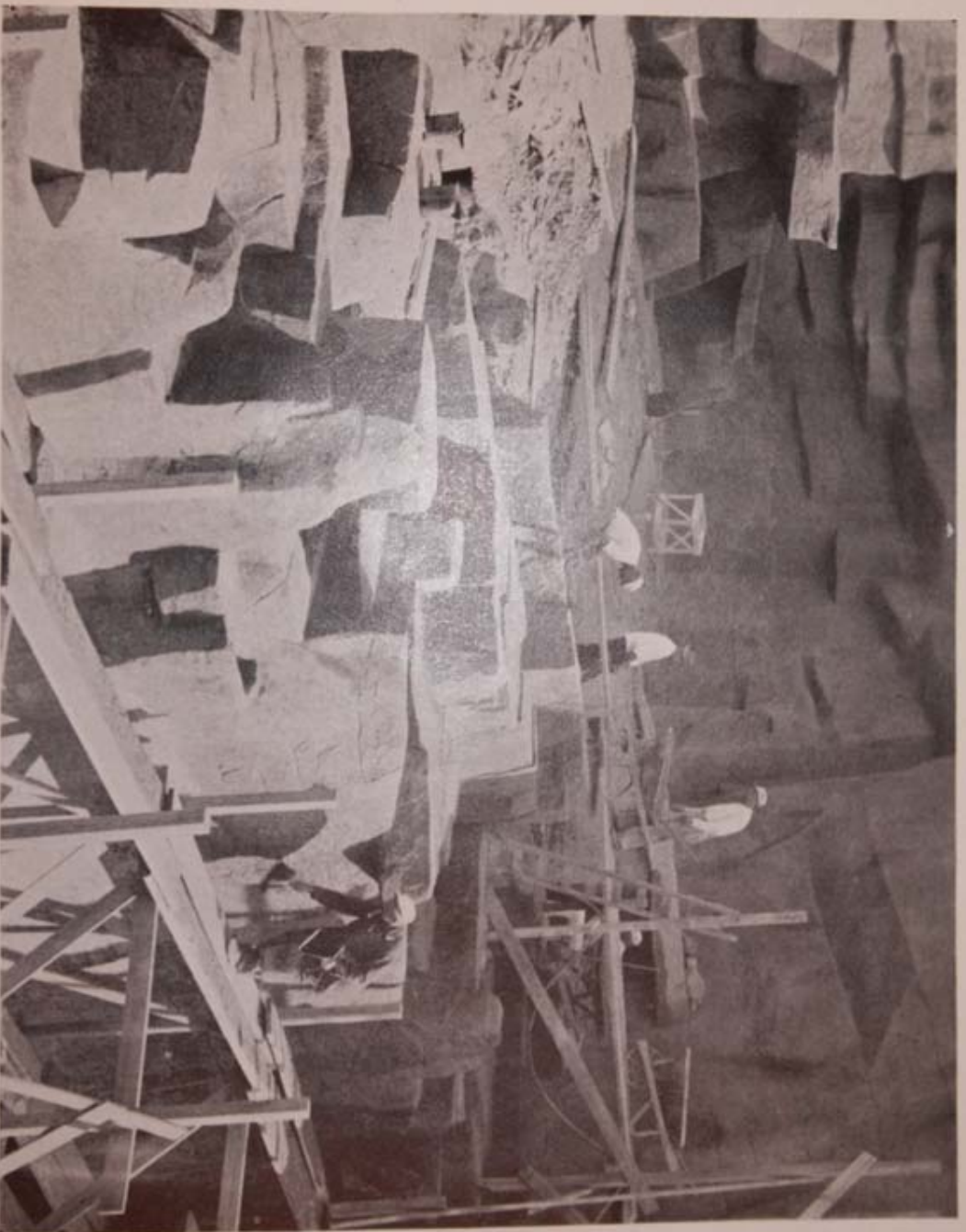


WORKING ON THE LION GROTTO AT THE CHICAGO ZOOLOGICAL PARK

ment of grouping animals and there is probably no more successfully kept collection in Europe.

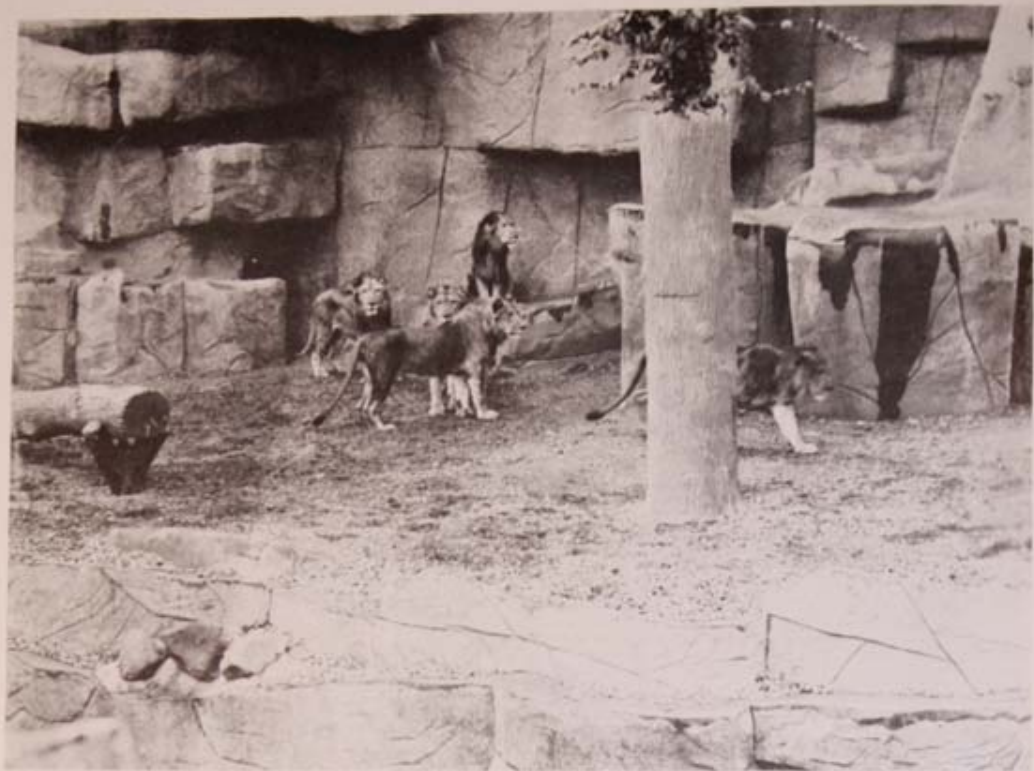
In some instances barless cages may be constructed for considerably less than the cost of the conventional type of enclosures. In most instances however, the plans and models include the excavation of deep and wide moats, their fabrication and provision for necessary sewage disposal and of a good deal of rock work. Backgrounds, partitions and floors may be built up of real stone, but this method is a very costly one and has perhaps a more artificial appearance than the work of skilled tradesmen and sculptors. The relief and texture of artificial stone has been accomplished in two essentially different ways. Borchart's process first used in Denver and then in St. Louis offers, I believe, the only method by which an accurate reproduction of rock work can be made, and that is from casts, negatives taken in the

field. Borchart reproduced stratified limestone with such care and knowledge that the deception is perfect. He was a very skilled artist and it is to be regretted that he did not attempt a reproduction of granite, too, for granite because of its texture surface and size finds greater and more acceptable use in barless cage construction, providing a number of pieces and a wide variety of animals are to be shown. It seems important to me that the same formation be used throughout the entire park, and that can be accomplished only if granite or sandstone is used. Papers on the building of the St. Louis rock and a more recent paper in *PARKS & RECREATION* on the San Antonio project, (bear dens and monkey paradise) excellently explain Borchart's process. Pieces built by Mr. Millen and the Chicago Zoological Society use the process initiated by Eggenschwieler. This has been widely used in Europe.



WORKING ON THE LION GROTO AT THE CHICAGO ZOOLOGICAL PARK

ment of grouping animals and there is field. Borchart reproduced stratified lime-



THE BEAUTIFUL LION GROTTO AT DETROIT ZOOLOGICAL PARK

A few details of its construction may be of interest. Small models, rather than plans of the project, are first prepared and as they are in constant use by the tradesmen in detailing and shaping of the steel and the sculpturing of the exterior cement surface, it is best they be prepared on a scale of one-half inch to the foot or better still one inch to the foot and that they be of hard surface and carefully reinforced. The sculptor of this small model must have some knowledge of the animals for which the enclosure is being built and must be prepared to accurately reproduce the formations. Photographs of pieces in the field are of a great deal of use in accurately preparing a model. Of still greater importance is the necessity of a correct grouping of the selected pieces to be reproduced so that the entire composition will be geologically correct. The first model, insofar as composition is concerned, should be shown for criticism to geologists. The animal houses or dens, and

the surrounding moats have usually been constructed before the rock work veneer is built. It is preferable to suspend this veneer from the structure itself rather than build it from independent footings upward. The rising and falling action caused by frost is of no concern when it is hung from the building walls and only lateral expansion need be provided for. Building tradesmen, metal lathers, claim the work of shaping the steel skeleton. Smooth mild round steel is used, steel in as long lengths as can be handled making a more rigid and better reinforced job. The steel skeleton when finished has the appearance of a huge cage, all steel being tied on ten or twelve inch centers depending on the weight of the final load. Steel of three gauges is used, vertical members are of one-half inch and three-fourths of an inch thickness; very little of the latter is used. All horizontal members are of quarter inch gauge. The steel skeleton is then covered with black dipped three pound



DETROIT EXHIBITS THE ONLY PAIR OF RHINOCEROSES IN CAPTIVITY IN BARLESS ENCLOSURE AT ITS ZOOLOGICAL PARK



AN INDIAN AND AN AFRICAN ELEPHANT DWELL TOGETHER PEACEFULLY IN THE DETROIT ZOOLOGICAL PARK'S BARLESS ENCLOSURE



A SPECTACULAR EXHIBITION OF ONE HUNDRED AND FIFTY HAMADRYAS BABOONS AT DETROIT ZOOLOGICAL PARK

diamond mesh metal lath. It is important that the lath be tied snug so that no relief be lost by rounded corners. It is necessary that bronze screening ten inches by ten inches square be inserted in certain concealed places of the rock work for air ports; in a sense this rock work must breathe. Large pieces which have been completely sealed have frequently exploded. The erection of this skeleton represents about sixty percent of the entire cost of the work.

As soon as fabricated with lath, it is advisable to apply the first cement scratch coat. Experience recommends the use of as little dehydrated lime as possible in this coat; a rich lime mixture may be more easily and quickly worked, but the leaching of white chemicals through the final sculptured coat is not desirable. This may be partially overcome by frequently moistening the scratch coat. It is well to back plaster immediately

so that the steel may be covered to prevent rusting and so that the bond of the scratch coat will not be broken in walking over it or moving scaffolding. At Detroit and Chicago, this has been accomplished by the use of the cement gun. A very dense concrete, concrete which is waterproof may be quickly and economically applied with the gun. This gun coat varies in thickness; on low rocks and rock bearing no load a coat of such thickness as will just cover the steel is all that is necessary. On formations of height and formations which must bear weight an engineer's advice is required. The outside coat, the one to be sculptured, is often applied with the gun. Certain architects and sculptors recommend that the outside final coat be applied by hand. In this method, and it is the one used in Chicago, a doubling coat is troweled over the original coat and given a deep scratch. It has been thought



POLAR BEARS IN SAN ANTONIO ZOO

advisable that no greater area be doubled than can be stuccoed and sculptured the next day. This doubling coat deteriorates very quickly if not covered. It should always be slightly dampened before the stucco coat is applied. In both scratch coats and the gun coat, the cement and sand ratio have been one and three; in the final coat, the one to be sculptured and colored, a one and two mixture permits finer cutting of detail. One objection to this mixture is that it sets up too rapidly in hot weather. This last coat, the one to be sculptured, is applied in the manner of stucco and its thickness varies from one-half inch to one and one-half inches in thickness. Of course, most of the relief is gained in the shaping of the steel and lath, yet the

sculptor may desire greater detail and at this point it can only be had by increasing the thickness of the cement. Experience here and elsewhere recommends that the rock be colored while the cement is "green." All colors used either dissolve in water or remain suspended in it and if the tinting is done before the cement sets up, the colors are absorbed in the crystalization of the cement as part of the moisture content and will remain fast over a period of time to any exposure.

We are indebted to Mr. Millen for he has always been generous in placing at our disposal his experience and suggestions for the improvement of this construction.





MAIN ENTRANCE TO THE FLIGHTLESS WING OF THE BIRD HOUSE, ST. LOUIS
ZOOLOGICAL GARDENS. THE TERRA-COTTA PLAQUE OVER THE ENTRANCE
IS CLEARLY SHOWN

THE NEW BIRD HOUSE AT ST. LOUIS

By HENRY M. KENNON, *Curator of Birds, St. Louis Zoological Gardens*

One of the outstanding events in the history of the St. Louis Zoological Gardens was the opening of the new Tropical Bird House last fall. In this building John E. Wallace, the architect, under the supervision of George P. Vierheller, director of the gardens, has made a radical departure from the stereotyped bird house of the past, incorporating in it the best features of the old type of building as well as many new and practicable conceptions, designed to display a large collection of tropical birds to the best advantage; and has constructed a bird house, which, both in beauty and in practicability, will stand as a model for many years.

The building is two hundred and three feet over its greatest length, and is one hundred and twenty-three feet in depth, and comprises the tropical house proper, and the flightless wing. It abuts upon the present elephant house, which, in the near future, is to be converted into the parrot wing.

The architecture is Spanish in type, to conform with the other permanent buildings of the garden, and is finished in cream stucco with terra cotta ornamentation. All ornamentation, both exterior and interior, carries out the bird motif, in harmony with the purpose of the building. Of particular note are the two large semicircular plaques of terra cotta in natural colors, over the principal entrances to the building. The plaque over the entrance to the tropical house depicts a group of both Old World and New World flamingos, while the one over the entrance to the flightless wing portrays a family group of ostriches. Capitals and cornices are decorated with such birds as penguins, cockatoos, owls, peacocks, doves, and wild ducks.

The tropical house contains fifty-nine cages, ranging in size from four feet, seven

inches by seven feet, for small birds, to a large group cage twenty-four by twenty-six feet, which at present contains a group of macaws and cockatoos. There are ten other large group cages for the display of larger or more outstanding birds. Three of the latter cages have floors of natural earth and are planted with tropical plants of various kinds, as well as being furnished with naturalistic pools, so that the cages present, as nearly as practicable, a habitat setting for the birds.

One of the greatest innovations in the house lies in the cages. All cage fronts are constructed of plate glass bordered by narrow strips of different types of wire mesh, depending upon the species of birds confined therein, thus giving not only a clear, and undistorted view of the bird, but permitting the public to enjoy the songs as well. This border of wire also permits free ventilation of the cage without danger of draughts. On all cages where the size will permit, the glass is pivoted, allowing it to be revolved, so that both sides of the glass can be cleaned from the outside, eliminating the necessity of a keeper disturbing the birds by entering the cage. This feature is one of the most practicable features in the house, for contrary to general belief, we have not had a bird escape through the front of the cage since the house was opened.

Instead of the usual straight perches across the cages, in all cases, trees, set in movable bases of concrete and rock, are used. In addition, in many of the cages, trees growing in tubs and plants in pots are introduced to carry out the habitat idea. It is manifestly impossible that this should be done in all of the cages, for many birds are very destructive to growing plants, but the work of decoration is being continued, and it is hoped that in the near future growing plants will be found in all cages



GENERAL VIEW OF THE FRONT OF THE BUILDING. TAKEN FROM THE FLIGHTLESS WING, LOOKING TOWARD THE MAIN BUILDING

where they are practicable. A light brown river sand is used as floor covering, adding one more detail to the naturalistic setting.

The partitions between the cages are of translucent plate glass, permitting the passage of light, but preventing pugnacious birds from attempting to fight their neighbors. The unglazed area of the cage walls is of smooth finished concrete, to permit easy cleaning, and is painted a pastel green of such a shade that at a little distance the walls seem to fade into infinity, making it difficult to determine the exact dimensions of the cage.

Aviculturists may be disposed to criticize the lack of outdoor cages, which are not only difficult to tie in, architecturally, with a building, but are difficult to care for as well. However, the necessity for outdoor cages has been eliminated by having a pivoted skylight, which may be turned so as to admit the direct rays of the sun, over every cage.

As one enters the building he is struck at once by the beauty of the entire layout, and is pleasantly surprised at the entire absence of any disagreeable odor. He meets a vista across a tropical swamp, through a large flying cage and into the large group cage for macaws and cockatoos. The swamp is also a habitat setting, planted with ferns, palms and other tropical foliage and containing a series of cascades and pools, affording a very beautiful setting for a group of tropical wading birds. Living turtles and fish add to the faithfulness of the picture. Separated from the swamp only by a partition of almost invisible copper screening, the large flying cage, also planted suitably, contains a group of many species of finches and wydahs, many of which are nesting in the cocoanut shells placed in the living trees. The opposite side of this cage is of plate glass, facing the glass front of the macaw cage. One's impression is that he is observ-



FRONT AISLE OF BUILDING

The main entrance is to the right, under the three wall lanterns, while the railing in front of the swamp scene can be observed at the left. At the end of the aisle is the entrance to the flightless wing.

ing groups of birds at liberty, since there are no obtrusive bars to break the sweep of vision, and more particularly since the front of the swamp is separated from the public only by a low railing.

On each side of the principal entrances of the building are found display spaces, filled with tropical foliage and containing small cages for special exhibits of birds.

Keepers' passages behind each cage permit all details of the care and feeding of the birds to be carried out without interference with the pleasure of the public, and minimize the danger of the escape of the birds.

The flightless wing contains seven cages of sufficient size to accommodate such birds as cassowaries, emus and rheas, as well as other cage space for the smaller flightless birds. Skylights are over each cage in this division also, and tropical plants beautify the display spaces. Outside runs are provided

for this class of bird, however, because of their need for space in which to exercise.

The building is provided with two large, isolated, well lighted and heated rooms for hospital and quarantine quarters. It is the invariable and very wise rule that each new bird shall go through a quarantine period of at least two weeks before it is placed on display, so the need of roomy quarters for this purpose can be appreciated readily. The cages in the hospital and quarantine room are portable, all metal, with drawer bottoms, so that all parts of the cage can be scalded and thoroughly disinfected as soon as it is emptied. The cages rest on all metal stands which also can be readily disinfected.

The kitchen is provided with custom built equipment for the storage of dry foods, as well as all equipment necessary for the preparation of the many kinds of food re-



THE SWAMP SCENE

As one enters the building, he meets a vista across a tropical swamp, through a large flying cage containing a large collection of finches and wydahs, across an aisle space and into another large flying cage containing a number of macaws and cockatoos.

quired by a large and varied exhibit of tropical birds. Provision is made for the thorough disinfection of each dish and utensil each time it is used. Wood is eliminated as far as practicable, both for the sake of cleanliness and to avoid hiding places for mice.

A large, well lighted office is provided for the administration of the building.

The air in the building is changed by a battery of fans sufficiently large to meet every emergency of ventilation. By their use the building is kept entirely free of any objectionable odor, and the air is sweet at all times. Warm air is circulated by a system of venturafins, each controlled by a thermostat.

In the basement are two large furnaces, one equipped for oil and the other for coke, either entirely capable of maintaining the

desired temperature even during the most severe weather. Under present running conditions, the oil burner is being used, leaving the coke burner for an emergency. Since the failure of an oil burner is by no means an unheard of thing, the extra investment required by the installation of the coke burner is very good insurance. Also contained in the basement are the hot water heating plant, public comfort stations, storage space, and other features necessary to a building of this type.

It is too seldom that the visiting public is impressed with the architectural artistry of any zoological building, but because of the careful attention paid to the many details of layout, ornament, and planting in this building, the greater part of the visitors make some comment on its beauty.

In this connection, one of the leading



ANOTHER VIEW OF THE SWAMP SCENE

Two of the flight cages are shown, as well as the cages across the aisle spaces.

papers in the city ran an editorial entitled "Architectural Art in the Zoo," which follows:

"Municipal architecture in the United States often is the cause for tears. Some buildings of that type exist in St. Louis, and city officials in the past have been panned for sanctioning them. It is pleasant, to find that St. Louis park and zoo officials have achieved something noteworthy and beautiful in the new tropical bird house in Forest Park. In all the United States it is doubtful if a lovelier structure could be found in any public park than this new building just opened. With its fine adaptation of Spanish architecture, its specially molded terra cotta decorations, beamed ceilings and attractive display of birds in their natural settings, this building should mark a new epoch for structures of its kind.

"Live bird displays on a large scale are

generally uninviting. They convey a painful impression that the birds are jailbirds. The arrangement of displays in this new building gives an exactly opposite impression. As an example of municipal accomplishment, and for the pleasure it will give thousands of St. Louisians and St. Louis visitors, the building is worth all it cost . . ."

The above is significant; the public and the press, in the present times, are much more interested in the results obtained from the money spent than they are in the amount spent. If they can be given esthetic pleasure in a structure and its contents, they are satisfied.

The glass fronts to the cages contribute in no small way to the general beauty of the interior of the building by eliminating the usual cross-barred effect of the old metal cage fronts. Despite many predictions to the contrary, there has not been one



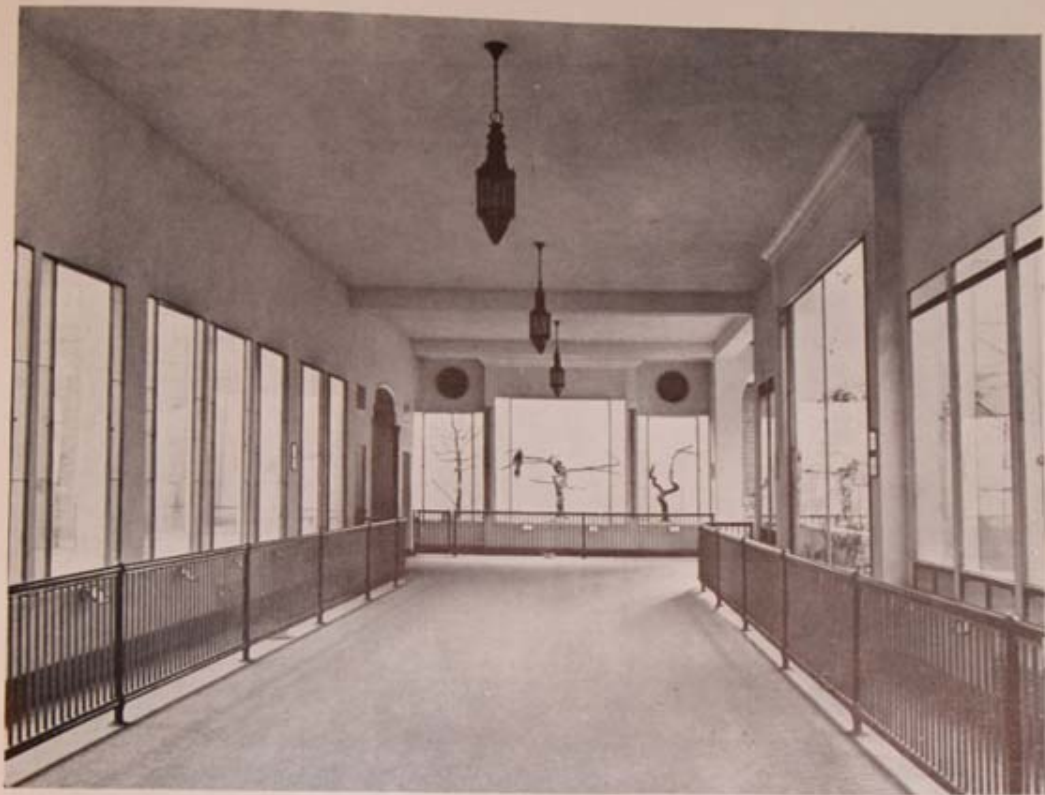
DETAIL OF PIVOTED GLASS CAGE FRONT

The glass is opened to show the method of operation. Note the screen wire grills on each side of the glass, both for ventilation and to permit the song of the birds to be enjoyed by the public. The method of labeling is also shown; the group label, telling something of the general habits of the entire group, is hanging on the wall, while the descriptive specific labels are in front of each cage.

bird lost from flying into the glass. The precaution of frosting the front of the glass with soap is taken when the birds are first placed in the cage, but this frosting is removed within a few hours. The birds

quickly learn that a barrier is there, and one may see them in the large flying cages, banking sharply in flight to avoid striking the glass.

Due to the experience of Mr. Vierheller



GENERAL VIEW OF ONE OF THE AISLES

The glass cage fronts can be seen clearly. The large glass on the right is the front of a flight cage containing growing plants, a naturalistic pool, and a collection of cardinals. Note the hornbills at the end of the aisle.

and the ability of Mr. Wallace, the tropical bird house in St. Louis ably demonstrates that beauty of building and exhibits may

easily be happily combined with entire practicability for the keeping of a large and varied collection of exotic birds.



OUTDOOR INSTALLATIONS AT TULSA ZOOLOGICAL GARDEN

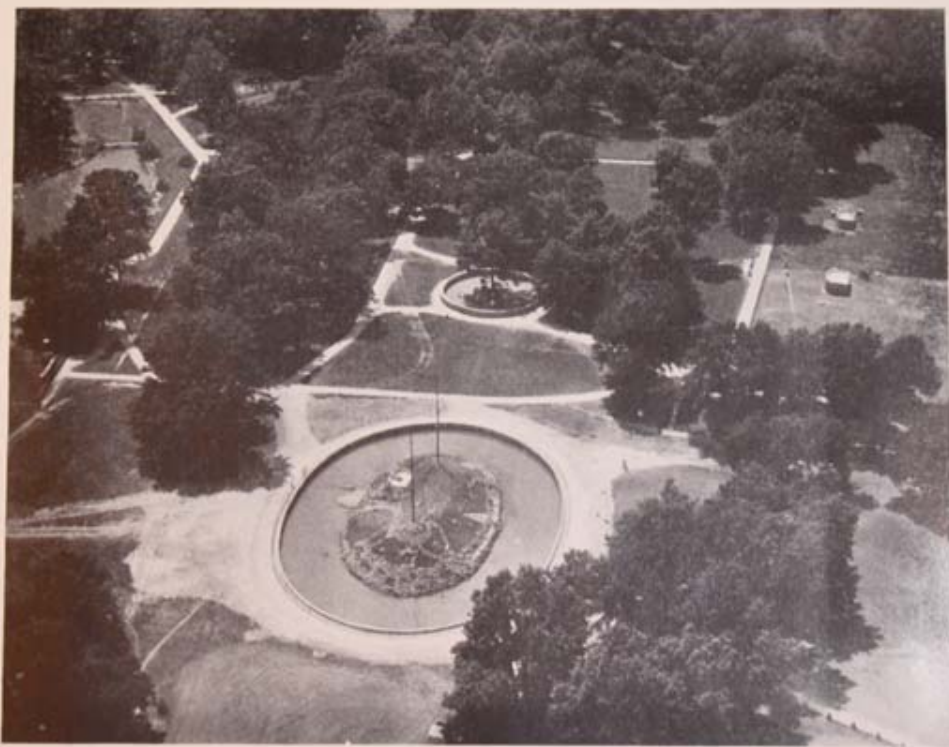
By HUGH S. DAVIS, Assistant Director, with Photographs by the Author

During the past two years a number of permanent outdoor enclosures have been added to the Tulsa Zoological Garden at Mohawk Park. These include new deer ranges, pheasantries, monkey island; a series of cages for wolves, foxes and native cats; badger and coati-mundi enclosures, and cages for monkeys not kept on the island. In nearly all of this construction native limestone rock, concrete and steel have been employed and the design has been such as to give commodious quarters and a pleasing effect in harmony with the landscape of the garden and with previously erected work.

The deer ranges were completed early in 1931. They cover about five acres and are in six sections, enclosed with park and paddock fence, and occupying a heavily wooded ravine section at the northwest corner of the garden. With the five acres previously fenced in this section, the quarters for native and foreign deer are now very spacious. The elk and bison have a twenty acre range at the extreme east end of the garden.

THE NEW PHEASANTRIES

The new pheasantries are located between the deer ranges and the bird hall. They



SECTION OF TULSA ZOOLOGICAL GARDEN

Monkey Island in foreground, with circular raccoon yard just beyond. The badger enclosure now occupying open space between not constructed when picture was taken. Wildfowl lake at upper left. Deer ranges at upper right.



NEW PHEASANTRIES AND ENCLOSURE FOR FANCY WATERFOWL LOOKING NORTH FROM BIRD HALL—TULSA ZOOLOGICAL GARDEN

are very durably constructed and are in sixteen units. The dimensions, not including the space within the guard rails, are 204 feet by 22 feet. Most of the sections are 18 x 12 feet and all are reached by a four foot runway in rear. Heavy chainlink fencing was used in the construction and the shelters are of rock and concrete. Special attention has been given to the shade plantings both at the rear and within the yards.

As a part of the general layout for the pheasantries an enclosure of formal design has been constructed for fancy waterfowl such as wood and Mandarin ducks, foreign teal, herons, ibises, coots, gallinules, etc. This enclosure contains a center pool and fountain for the waterfowl and smaller pools at either end for fish. The installation was erected on the site of the old pheasantries.

THE MONKEY ISLAND

The new island was opened on June 9, 1931. The dimensions of the entire con-

struction are approximately 180 x 130 feet. The water moat surrounding the island is 30 feet in width.

During the summer of 1931, rock enclosures for badgers and coati-mundis were added. These, with the monkey island and raccoon enclosure (built in 1927), make a unique and pleasing series of exhibits, as in all of them the beautiful honeycombed limestone rock has been freely employed to good advantage. In these enclosures the animals enjoy what amounts to practical freedom. The pair of coati-mundis raised five young this year and all have lived to maturity, being in splendid condition with excellent fur. The coati-mundis and raccoons have living trees in their yards, and all have running water bubbling from artificial rock springs.

Work on what eventually will be a series of twelve cages for wolves, foxes and cats was begun in the early fall of 1931 and seven were completed and in use by No-



NORTH SIDE OF MONKEY ISLAND, TULSA ZOOLOGICAL GARDEN



COATI-MUNDIS IN THEIR LIVING TREE
AT THE TULSA ZOOLOGICAL GARDEN

vember. Cage supports and dens are of rock construction.

The Tulsa Zoological Garden is specializing on its outdoor exhibits, aiming to combine a proper display of these with a pleasing arrangement of its landscape and architectural features.

A fine compliment was given the Tulsa garden recently by a visiting park and recreation expert who said "In the Tulsa zoo, the animals seem to be happy that they are there."



SOUTHWEST SIDE MONKEY ISLAND—TULSA ZOOLOGICAL GARDEN



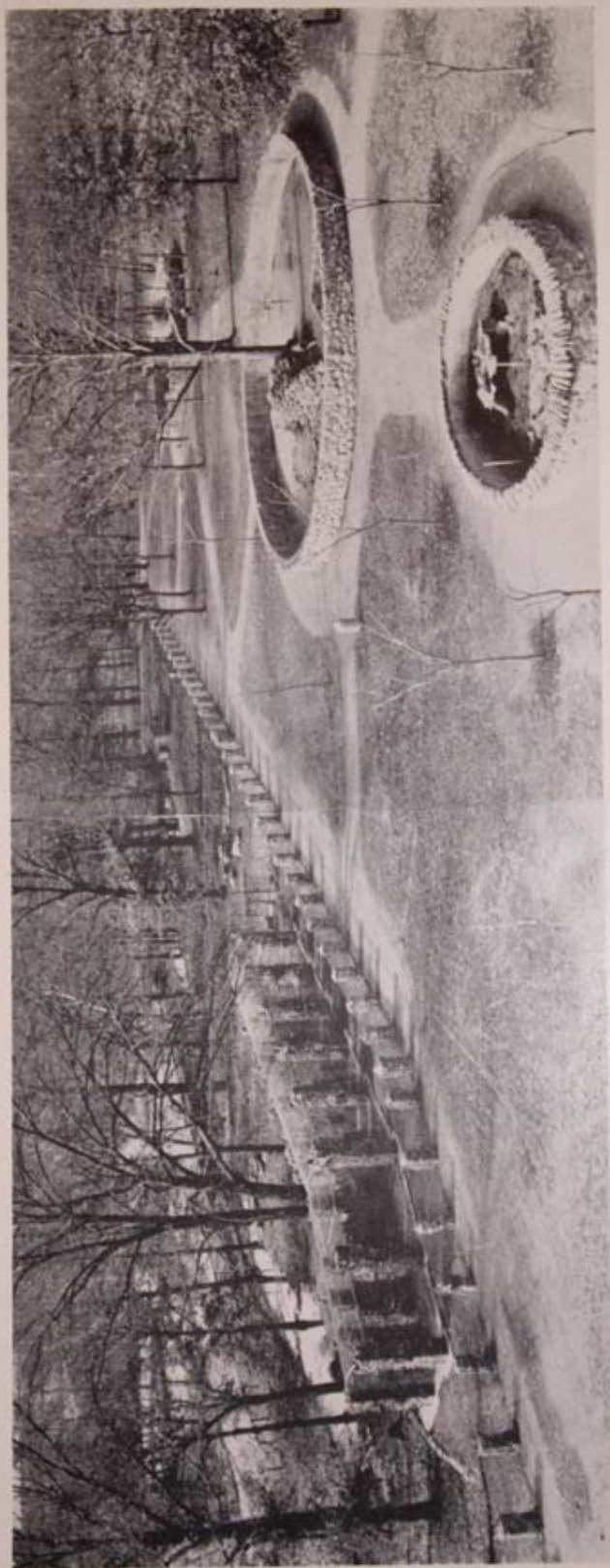
SUNBATHS AT THE WATERFALL ON MONKEY ISLAND



SOUTHEAST SIDE MONKEY ISLAND—TULSA ZOOLOGICAL GARDEN



RACCOONS IN ROCK ENCLOSURES—TULSA ZOOLOGICAL GARDEN



Photograph by Hugh S. Davis

NEW CONSTRUCTION IN TULSA

Bird's-eye view from monkey island of section of Tulsa Zoological garden—showing in left foreground the first seven cages for wolves, foxes and smaller cats, with five more to be constructed; at right, badger enclosure in foreground and back of it are the raccoon and cockatiel yards, Wildfowl lake at left.

BIRD HOUSE FOR THE SMALLER ZOO

Fort Wirth recently completed its new bird house for the zoo at a cost of \$3,000.00. As the cost indicates, no great amount of money was spent in erecting an elaborate dwelling for the birds, but the structure meets the needs of the zoo at this stage of its development. The plans were made by Hare & Hare of Kansas City.

The house has eighteen double compartments for the birds—that is, there is one inside and one out, the two being separated by a casement window. The upper portion of the building is lined with celotex and the backs of the cages are lined with wide matched cypress. The floors are made of pine with two coats of linseed oil. The building is of frame construction with an asbestos slate type of composition roof.

The cages are three feet off the floor and

are enclosed with plate glass doors that swing from the top. This particular feature of having glass on the front makes the interior of the bird house very attractive. The main floor of the building is concrete with no attempt at ornamentation.

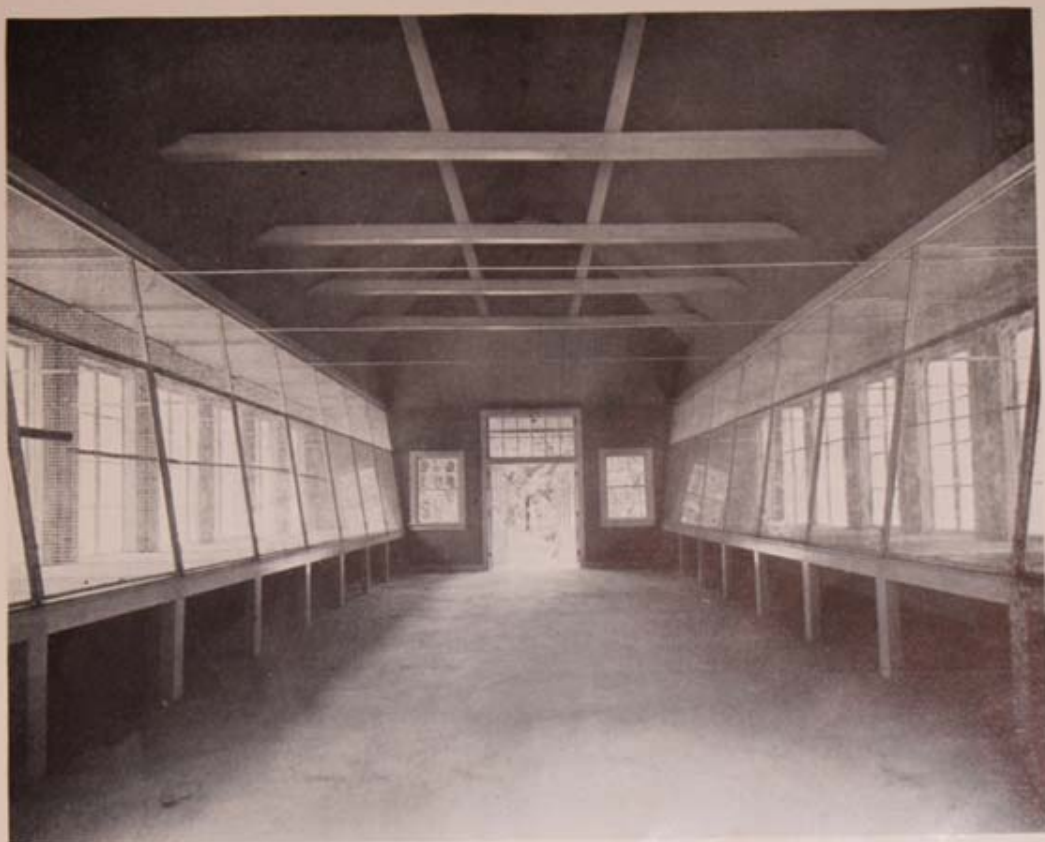
The building is well lighted and ventilated and beautifully located on a wooded slope of Forest Park. It is a credit to any zoo the size of Fort Worth's.

Interest in the Forest Park Zoo at Ft. Worth has increased by the recent organization of the Ft. Worth Zoological Society, with J. J. Hurley as president.

The society, as formed, will be one of the most democratic organizations in the city. Its major purpose will be development of the Forest Park Zoo into one of Fort



EXTERIOR OF FORT WORTH BIRD HOUSE



INTERIOR OF FORT WORTH BIRD HOUSE

Worth's show places and an institution for education and entertainment of children.

Since the zoo is primarily for their entertainment and education, a special effort will be made to enroll every school child in the city as junior members of the society.

Hurley, who has served on the com-

mittee to draw up constitution and by-laws and who in that capacity has made a close study of other zoological organizations in the country, expressed belief that formation of the society will mean development of Forest Park Zoo as one of the most outstanding zoological parks in the Southwest.



VARIATION IN CONSTRUCTION TYPES

The illustrations on preceding pages and the random selections on the following pages include types found in the older zoos as well as those in the more modern gardens. They are given for purposes of comparison rather than as models to be followed. If similar designs and styles of architecture were adhered to, our zoological gardens would soon lose their originality and individuality. There is a wide range of types to be studied and the established plan, locality or layout of the grounds will often be the determining factor in deciding on construction types.

It will also be noted that there is a con-

siderable difference in opinion among our zoological parks experts as to the best general plan for a garden. In fact, it might be said that these leaders have divided themselves into two general schools—the one advocating a plan such as has produced the wonderful New York Zoological Park and the other the barless type of the Detroit Zoological Park. Many zoos have effected a satisfactory and pleasing combination of both plans.

It is not the purpose of this book to arbitrarily advocate either plan but to set before prospective zoo builders the advantages and shortcomings of both.



BIRD HOUSE AND WILDFOWL LAKE—PHILADELPHIA ZOOLOGICAL GARDEN



INTERIOR BIRD HOUSE IN PHILADELPHIA



CARNIVORA HOUSE, TOLEDO ZOOLOGICAL PARK



BEAR ENCLOSURE AT PORTLAND, OREGON



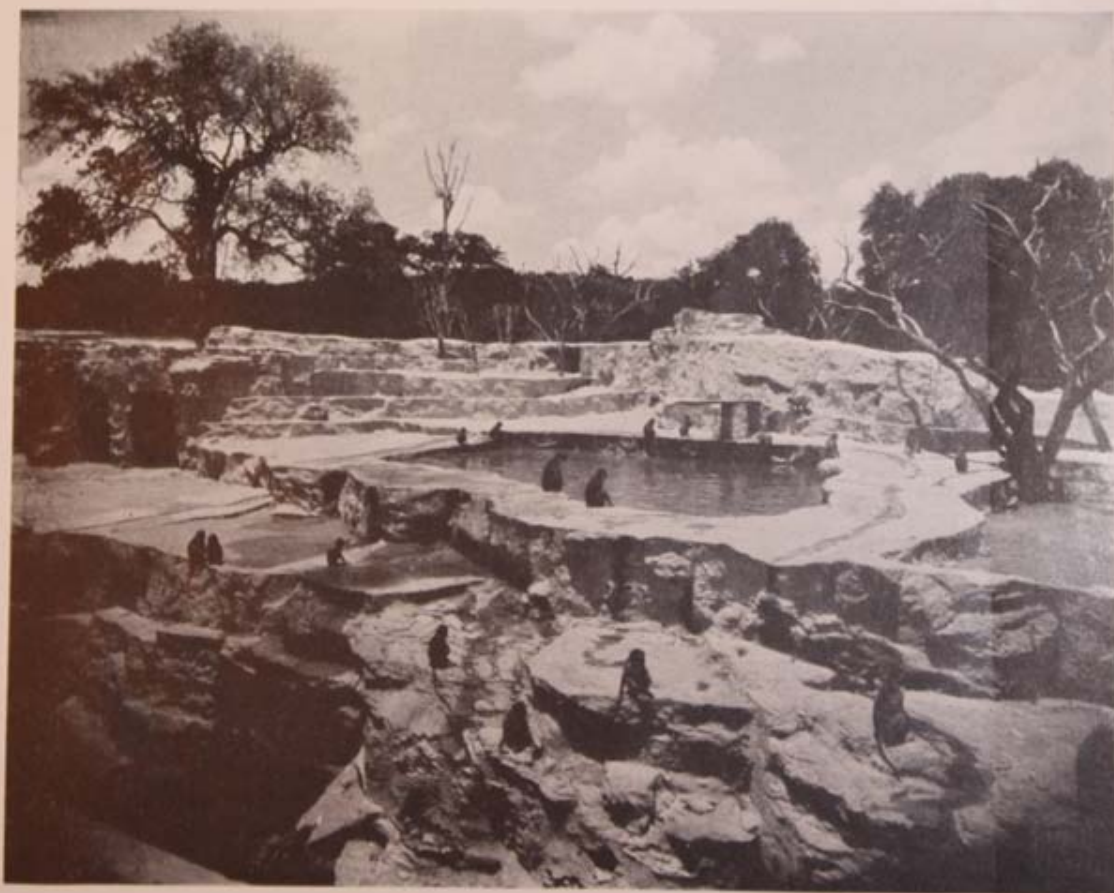
AVIARIES FOR GAME BIRDS AT DENVER



INTERIOR PROBOSCIDEA HOUSE AT TOLEDO



GENERAL VIEW OF BEAR TERRACES AT SAN ANTONIO, TEXAS.



MONKEY ENCLOSURE AT SAN ANTONIO



INTERIOR OF PRIMATE WING, HERSHEY, PA.
ZOOLOGICAL GARDEN BUILDING



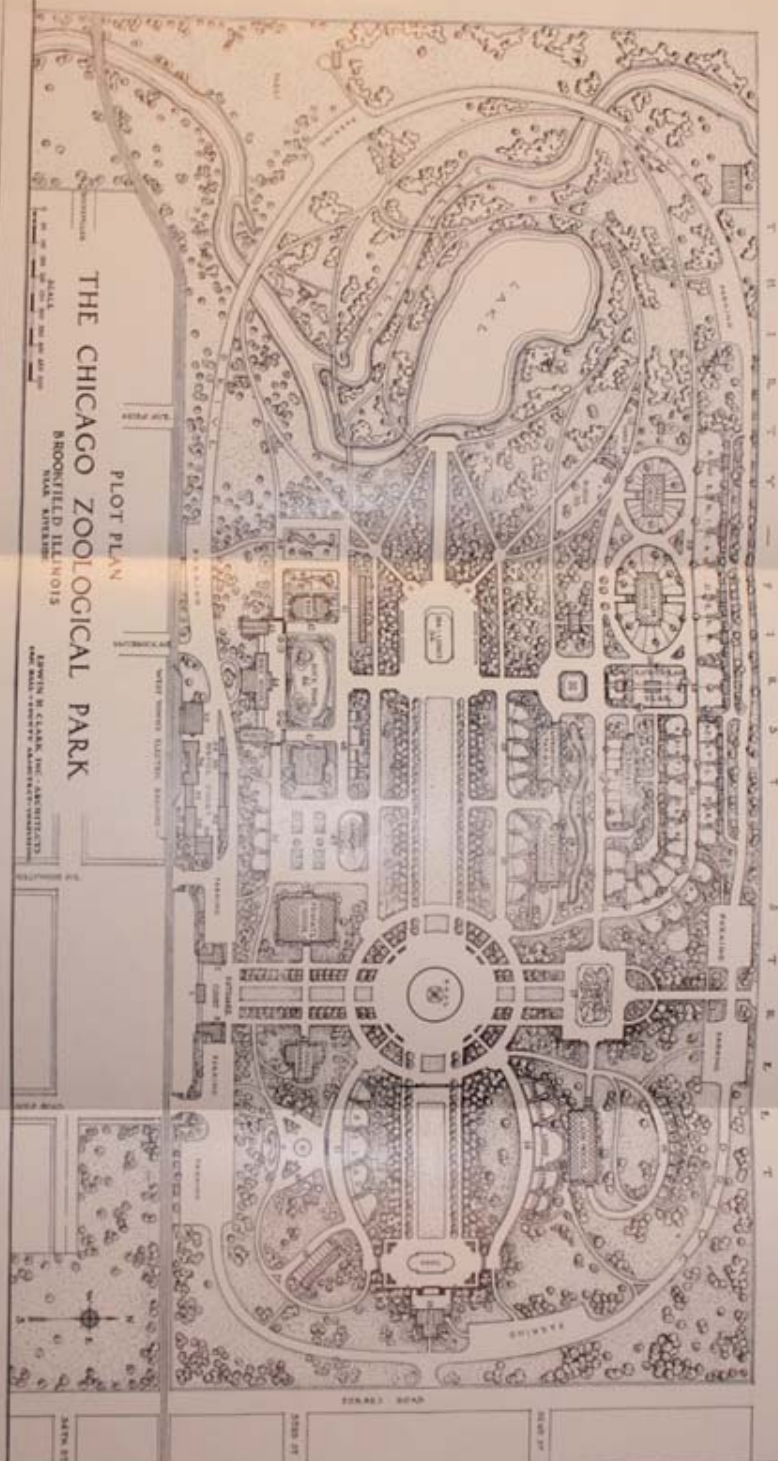
PRIMATE HOUSE AT PORTLAND, OREGON



AN OUT-OF-DOORS LION HOUSE AT AUDUBON PARK, NEW ORLEANS



DESIGN OF SMALL MAMMAL ENCLOSURES AT ST. LOUIS



- 1. Main Entrance
- 2. Main Building
- 3. Main Plaza
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BREEDING AND RAISING SOME OF THE ANTHROPOIDS IN CAPTIVITY

Paper by C. EMERSON BROWN, Director, Philadelphia Zoological Park, before Annual Meeting of American Association of Zoological Parks and Aquariums at St. Louis, October 1, 1930

The breeding and rearing of young animals of all kinds in zoological gardens have not received sufficient attention in this country. It seems to me it should be of paramount importance for us to do the best we can to breed specimens of all kinds for exchange with our neighbors, so that each zoo could maintain a collection of wild animals of the world so far as possible by this means. I am of the opinion that with the proper care and attention to details, also our rapidly increasing knowledge, many more species than we have any idea of at the present time, could be bred. We all know that great numbers of birds, mammals and reptiles have never been born in captivity, and probably never will, but we can all try, and in some cases perhaps succeed where others have failed.

The Philadelphia Zoo has the distinction of having had conceived and born in captivity the first orang-utan in the United States and second in the world. The first, born in Nurnburg, Germany, lived for only a few days; the first born in the Philadelphia Zoo lived about a year, but we learned something from that year's experience. The third orang to be born in captivity occurred in Havana, Cuba, on Madame Abreu's estate, and the fourth again at the Philadelphia Zoo on Friday, July 11th at 9:10 A. M. This animal seems to be a much better specimen than the first and at the present time appears to be in excellent condition; eating regularly and growing rapidly. Maggie, the mother of both youngsters born here, is a quiet and most attentive mother.

We have learned that the most important factor in breeding orangs is to secure a congenial pair that are old enough to breed.

According to our records, all previous animals purchased were young, say, from one to three years of age, and none of these have lived to be over six years old. It was my idea, therefore, to purchase older animals and see if they would breed. The female, Maggie, probably fifteen or sixteen years old, was purchased on May 12, 1926, at the cost of \$1,000. She weighed about one hundred and thirty pounds upon arrival here. On September 13, 1927, we had the opportunity to purchase an exceptionally large male, Chief Utan, for which we paid \$3,000. Chief Utan was a remarkably large and ugly-looking specimen, with a reach of something over eight feet, with fully developed callosities making his face about twelve inches in width. He was very strong and vicious and weighed about one hundred and seventy-five pounds. Extra precaution was taken in transferring him to the cage. For a few days he was kept separated from the female but within sight of her. The cages were kept far enough apart so that in case Chief Utan took a dislike to his new wife, he could not injure her in any way. Finding, however, that they were friendly, the door was lifted and Chief permitted to enter Maggie's cage, where he remained until April 4th when they were separated on account of the expected birth. On September 25, 1928, a male was born to the pair. As near as we could figure, the gestation period was slightly over eight months. Maggie, as I have said, was an excellent mother, showing no signs of nervousness, but never letting the baby out of her arms for a moment. As it gained strength she would try teaching it to walk and climb by placing its hands on the bars of the cage and gently pushing it upward until it had

climbed as far as she could reach. Then she would lift it to the floor again. While not vigorous, the baby spent most of its time climbing about over its mother and nursing at frequent intervals. Lucky, as we called him, lived about a year and died of spinal meningitis.

Maggie and Chief were again placed in the same cage, and on July 11, 1930, Nor-suto, another male, was born. This youngster seems to be in much better condition than the first, and we are doing our best to raise him. Details of this birth were printed in *Mammalogists' Magazine*, Vol. 2, No. 3 of August 1930, and a few reprints of this article are available through the office of the Philadelphia Zoological Garden.

The notes on the birth of the second orang-utan born at the Philadelphia Zoo on July 11, 1930, at 9:10 A. M. are as follows: Very soon after the birth had taken place the mother ate the placenta and licked the baby until it was entirely cleaned up. The cord however, which was about fifteen inches long, remained attached to the baby until about 3:00 P. M. the next day. At 6:30 of the same day (July 12th) the mother took the baby to her breast for the first time and it nursed. This was about thirty-three hours after the birth. The mother held the baby close to her body never letting it down to the floor until August 28th, forty-eight days after birth, when she allowed it to leave her for the first time for short periods.

In comparison with the chimpanzee the baby seemed very slow to creep or try to walk. On September 15th however, the mother assisted it to climb the bars of her cage to a considerable height, or as far as she could comfortably reach. Up to September 20th there were no teeth showing.

On October 1, 1928, just five days after the birth of the first orang a baby chimpanzee was born at the Philadelphia Zoo. Marianne and Sultan, the parents, came to the garden in the spring of 1924 when they were about three years of age, and have been together ever since. At the time

of this birth the parents were about $7\frac{1}{2}$ to 8 years old, a little younger than I would expect to be the breeding age. This, I believe, accounts for the fact that the mother, crooning and licking over her young one, failed to pick it up and nurse it. A peculiar incident connected with this birth is the fact that the young one appeared to be dead at first and did not breathe. The mother leaning over the baby placed her mouth over that of the young one and appeared to blow into it. In a moment it breathed slightly. This act was again repeated in a few moments after which the baby's chest was seen to rise and fall regularly and it appeared to breathe easily. Both Dr. Fox and Mr. McCrossen, the keeper, observed this, and a full account of the birth was published in the *Journal of Mammalogy*, Vol. 10, No. 1 of February, 1929. The baby was removed from Marianne's cage after she persistently refused to nurse it, as it was becoming cold and weak. Placing it in a basket in warm blankets, it was fed a mixture of one part evaporated milk to six parts of water every two hours. It was given every care and fed regularly day and night, but our efforts were futile as it died after six months of careful nursing.

The second chimpanzee, a female, born at the Philadelphia Zoo to the same pair, arrived at 8:05 A. M. on April 26, 1930. Marianne seemed to understand the nursing of this one, but left it on the floor until four o'clock in the afternoon when the keeper reached his arm into the cage in an attempt to take hold of the baby. She immediately picked it up, a hind leg in each hand with head hanging down as though she were going to put its legs around her neck. She held it in this manner for about ten minutes and then placed it on the floor again. The keeper handed her a cup of milk and while holding the cup in one hand, she raised the baby with the other to a natural position in her arms. She continued to hold it until 1:30 A. M. April 27th, or a period of about twenty-

nine hours, when she raised it a little higher and it took hold of the right breast, nursing for the first time. From that time on she has nursed it regularly. The baby has gained rapidly and is now able to walk (although unsteadily) and creep and climb a little. It has a heavy coat of black hair and appears to be in the very best of health.

I have a few notes on this baby that may be of interest, as follows:

On August 7th, three months and fourteen days after birth, the first sign of teeth were noticed, the baby rubbing its gums called our attention to this and upon examination we found two front teeth coming through. On August 9th, two days after, a third appeared; and on August 13th two lower teeth were visible.

On August 18th the baby showed the first sign of being interested in food and was seen licking an orange.

The teeth appeared rapidly after this day. On September 19th, Sultan the father, who was in an adjoining cage, showed considerable interest in his son, trying to play with it by sticking long pieces of hay through the bars. On September 20th the baby's muscles were developed so that it was able to climb two feet or more at the side of the cage without assistance and at present is running and climbing without difficulty.

Summing up those points that I believe will give the best results—

1. The male and female of the anthropoid apes, and in fact many other mammals, should be separated at least two months prior to the expected date of birth.
2. The female should be kept as quiet as possible and given plenty of clean hay, good nourishing food including green stuff, plenty of fresh air, sunshine and be left strictly alone. At the time of birth, no one should be permitted to approach the cage except the keeper whom she knows and trusts. During the first month at least after the young one is born, the male should be kept out of

sight and hearing, if possible, of the mother and baby. The only thing that seems to frighten this baby is the frightful noise made by the male which is kept unavoidably in the next cage. When the baby hears it, it runs with every expression of fear and trembling into the mother's arms.

Now a few words regarding the gorilla which we have so successfully raised from a baby about a year old and twelve pounds in weight to a good healthy animal now weighing 72½ pounds. Gorillas, that I have had reports on, in good condition and health, gain weight at the rate of about two pounds per month. Ours at this time is 4½ years old and appears to be in excellent condition. He is fed as follows:

6:30 A. M.	1 pint buttermilk.
8:00 A. M.	1 orange and 3 bananas.
11:00 A. M.	4 slices zweiback in warm milk.
1:00 P. M.	1 pint buttermilk.
2:00 P. M.	All the lettuce he will eat.
3:30 P. M.	Slice of bread spread with honey.
4:00 P. M.	2 slices zweiback in warm milk.
4:30 P. M.	1 pint buttermilk.
5:00 P. M.	1 apple and teaspoonful codliver oil.

This is a carefully planned and studied diet, and, in our own case, has so far proven very successful. We have at least made a good start in raising the anthropoid apes in our very trying Philadelphia climate, and have given the world some records heretofore unknown. My only hope is that the Philadelphia Zoo as well as all other zoos in the United States will be able to do more in the years to come toward keeping alive and breeding in captivity animals that may, in the near future, become extinct. We are rapidly nearing a point where many species are becoming scarce and more difficult to secure.

VALUE OF VETERINARY SERVICE IN A ZOOLOGICAL GARDEN

By DR. REUBEN HILTY, *Veterinarian to the Toledo Zoological Society and
Past President American Veterinary Medical Association.*

All my life I have been interested in animal life, but it has been only about six years that I have been intensely interested in wild animal life, and more particularly in wild animal life kept in captivity. It is a most interesting hobby and one that gives a man a great many opportunities for study, investigation and research.

In the care of wild animals in captivity, by the kind coöperation of three men in particular. Drs. Blair and Noback of the New York Zoological Park and Dr. Kammerer of the St. Louis Zoological Park. These men have always been willing to help me, in anything I have asked them.

In the care of wild animals in captivity, there are a great many things to consider and keep in mind. One of the most important of which is that few, if any, such animals get their natural food, and they are in artificial surroundings. The first thing to determine when a new animal comes into a collection, is what part of the world it comes from, what are its natural surroundings, then find out what grows there, and, as nearly as possible, what this certain animal has been living on in its wild state. Then next determine as nearly as possible, the substitute food that will come nearest filling its natural requirements.

In the feeding of the carnivorous animals, and some of the birds, the change is not so great as in most other animals. In the feeding of the carnivora, the changing of their diet at times is often overlooked. Many keepers (and this is not so much the fault of the keeper as the fault of those who are responsible for furnishing him the feed) will feed the same kind of meat week in and week out, without ever thinking of changing to some different kind of meat for variety, or even giving such parts as the kidneys, livers,

lungs, or even the guts of healthy animals; an occasional chicken or duck will often act as a fine tonic for some cat animal that needs a little encouragement. Of course, it goes without saying that an occasional day of fast is good for any carnivorous animal.

Gastric intestinal disorders of captive wild animals are the bane of the management of any zoological garden. These can be largely overcome, or rather avoided, by a careful study of the requirements of the animals in your charge, and, on the other hand, if the food is of the highest quality and fresh.

PAST NEGLECTS

It has been only comparatively of recent date that we began to pay attention to the vitamine content of different foods. And it has not been so long that we paid much attention to the importance of sunlight to the well-being of animals. We have for two years attempted to supplement that natural sunlight by exposing all of the food of the carnivora and the food for the birds in the winter time to the ultra violet rays of a Quartz lamp. We feel that a great deal of the success in raising our young animals is due to this effort.

There is much more difficulty in obtaining the proper substitute diet for some of the herbivora. The principal reason for the difficulty of keeping the moose and caribou in a zoological garden is that it is almost impossible to supply them with a proper substitute diet.

One should look to it that there is more or less of a variety of rough feeds for such animals as the elephant, hippo, rhino, buffalo and in fact all the hay eating animals as we so often hear them classed. They need more course feed than is usually given them, and in season they should by all means have green feed, such as green cornstalks and

green grass. In the winter time these animals should be fed roots, such as mangles, sugar beets and carrots. In most large cities it is not difficult to obtain all the lettuce and cabbage trimmings as well as celery trimmings which all make good green feed and are very much relished by the animals.

We had an interesting experience two years ago, when we acquired a fine pair of giraffe. Never having had giraffe in the park before we were very anxious about their feeding. Had we listened to all the advice we received on this subject we certainly would not have them today. One man with a great deal of experience said they must have only red clover hay for roughage; another said they dare have nothing but timothy hay, and still another said mixed hay, but all were decided on one thing that alfalfa should, under no circumstances, be given them. Gradually we tried all these different feeds and finally we found they could eat any one of them, or all, with perfect impunity, and did better on pure alfalfa hay than on any other variety. So it is clear to see that in the feeding of wild animals in captivity, most of us have merely begun to scratch the surface insofar as their diet is concerned.

We can well take lessons from intelligent feeders of domestic animals, especially from men who breed, and men who feed meat producing animals for market and men who feed for milk production. It has not been so long ago that we paid no attention to the need of minerals and the feeds that properly balanced gave us these substances so much needed especially for the pregnant animals and the young. Little did we know a lack of these substances was responsible for so many weak newborn, or little did the farmer think a deficiency of the proper mineral content was the reason for his favorite brood sow dragging her hindquarters about the pen unable to walk. Today, the intelligent feeder feeds the pregnant animal so that when the time comes for her to nurse her young, or in the case of the milk cow, they have enough of these minerals stored in their

systems to supply their needs, without drawing on their own normal supply too strongly.

The same fundamental principles must be followed in caring for wild animals in captivity, as in the case of domestic animals on the farm. All animals added to a collection should be carefully inspected on arrival for symptoms of any infectious or contagious disease, then placed in quarantine for a period of time sufficient to be sure that they are healthy before being placed in contact with the other animals of the collection. It has often happened that such dread diseases as distemper have been brought into a zoological garden, and by so doing a lot of valuable animals be lost. Dogs of no kind, either running loose or with their owners, should be permitted within the zoos; this is one of the easiest ways of zoo animals becoming infected with distemper.

CLEANLINESS IMPORTANT

Cages for animals should be so designed and constructed that they may be kept clean and sanitary with the least effort possible. Floors should be of cement or some other material that does not take up much moisture, in this way it will be much easier to keep down infections.

To maintain safe and clean quarters for captive wild animals takes a great deal of study and careful planning, and the utmost vigilance in the cleaning and disinfection of cages and quarters. All feces, and food that has not been devoured, should be removed promptly. This simply makes a splendid place for flies to breed, also a splendid media for the development of all kinds of bacteria. The prompt removal of all feces also reduces the possibility of infestation or reinfestation with the various animal parasites. It also keeps down to a minimum obnoxious odors, and leaves the cages much more presentable for public inspection.

The kind of disinfectants used should be carefully selected. If a strong disinfectant is used, especially one of the coal tar derivatives, it is liable to irritate the skin of animals that lie down before the floors are dry. If

such is used it should be washed off with clean water before the animals are allowed to come in contact with the floors. Creoline or any of the coal tar derivatives are dangerous to any animal of the cat family, on account of the cresylic acid content. I well remember an experience with a circus lioness several years ago that had been saturated with a creoline solution to kill fleas. The owner was very much surprised to hear that the sickness and subsequent death of his favorite animal was due to the use of creoline.

There is a much closer relation of diet to disease than is commonly thought by the average man. Food in the real meaning of the term is anything consumed, that goes directly or indirectly to growth, repair of the animal body or to the production of energy. A proper diet is one on which an animal will develop normally and keep up its normal weight and show a minimum susceptibility to disease, breed normally and rear its offspring. Some months ago a very observing physician said to me, "Proof that the Toledo Zoological Society is getting somewhere in the care of their animals is that the animals are breeding and are raising their young." Food for any animals must fit the demands of the particular type of gastro intestinal tract possessed by that animal, for instance the carnivora have small stomachs and a short intestinal tract, suitable for the digestion of meat diets, the digestive processes of which are accomplished in a much shorter period of time than vegetable foods.

The herbivora whose food is derived from plant life, which requires a much longer time for its digestion, have on the other hand, enormous stomachs, and a long small intestine. I am simply pointing out to you the above to show you that a knowledge of comparative anatomy and a more or less knowledge of zoology is necessary to be able to intelligently prescribe the diet of the different animals found in a zoological garden.

Diagnosis is in a great many cases most

difficult and unsatisfactory, unless one is a close observer and spends some little time with the animals, observing them and keeping in touch with the keepers. Too often by the time disease has advanced to the stage of becoming externally noticeable to the average man it has gone so far that medical interference is of no avail. Then again it must be remembered that drugs act differently in different species of animals. My plan has been to spend as much time as possible with the keepers, observing the animals together; and encouraging the keeper to become an observer, in this way training him to notice any unusual actions of an animal that might be indisposed.

There are a number of reasons why there has been comparatively little work done among wild animals in captivity by veterinarians. Few veterinarians have taken the time or trouble to prepare themselves for this class of work; then again in many instances directors and officials have been more free to take the advice of keepers or circus men in preference to that of veterinarians. Let me recite an experience I had in our park. Several years ago the only elephant in the collection at that time choked on a sugar beet. After having tried for several days to devise some kind of an apparatus to hold the animal's mouth open in order to be able to use a probang to push the sugar beet on down they became discouraged. I was called in for consultation and offered to anaesthetize the animal and perform an oesophagotomy, and remove the obstruction, which suggestion was laughed at by those in charge. I walked out of the picture after requesting the privilege of showing them on post mortem how easily it could have been done. This they granted. Two days later the animal died. I performed a post mortem oesophagotomy, which was very little more difficult than it would have been before and removed the sugar beet easily.

A few years ago an animal dealer visiting our park suggested to a keeper a certain book that would be valuable to him, and offered to send it to him. The keeper replied "Oh

hell, who ever learned anything out of a book." Of course the book never came.

Another experience with this same keeper about a year later was the cause for drastic rules that no keeper shall prescribe for any animal in the park. A very fine zebra developed a prolapsus of the rectum due to a large number of the larvæ of the bot fly attached to the mucous membrane. We removed all visible larvæ and treated the animal to remove the larvæ left in the stomach and bowels. Consultation was held with a proctologist and the animal was making splendid progress under the treatment we had outlined, but too slowly to suit the keeper, who, without the knowledge or permission of anyone, injected several ounces of a saturated solution of alum. In less than twenty-four hours the animal was dead.

SOME PERSONAL EXPERIENCES

An experience will demonstrate the value of proper diet for a pregnant animal, as well as the suckling mother. A female llama suckling a young one about two months old became weak in the hind quarters, and finally was unable to get up without the help of several keepers. My attention was called to the case, and on investigation it was found that the keeper had changed the feed ration on this animal during pregnancy and since without permission. My diagnosis was calcium deficiency. A treatment was prescribed and carefully carried out, and even though the keepers and some of the officials insisted the animal had been injured she made a rapid and uneventful recovery.

We had an interesting experience with a very fine young lioness. This animal on reaching puberty would have convulsions during nearly all her heat periods. The keeper insisted that these were caused by worms, and, without my knowledge, gave her several doses of worm remedies, which simply aggravated the convulsions. My diagnosis was cystic ovaries, which was verified on post mortem, the animal having died in one of these convulsions. While in a similar case one would most likely not be

able to remedy a like condition by any line of treatment, still the animal might be saved for exhibition purposes by surgical interference removing the ovaries.

Several years ago we had a buffalo cow die very suddenly. On this one no post mortem was held, but two days later we lost another in a similar way. This time a post mortem was held, and my diagnosis was hemorrhagic septicemia. All the hoofed animals and birds were immunized by using hemorrhagic septicemia aggressin, and we lost no more animals from this disease. Since this experience we have immunized twice per year, and have lost nothing except two or three birds from this disease.

SURGICAL CASES

We have had quite a number of interesting surgical cases in our park. I will recite only a few to show you that one can readily accomplish thing in a surgical way even with wild animals.

First, a case in a female monkey that was more or less continuously in heat and with her vulva swollen enormously was an unsightly object for children to look at. I advised the officials of the Society that this animal should be either destroyed or operated on for the removal of the ovaries. I was given permission to operate, with the result that the effort was a perfect success, and this animal is now one of the finest specimens in the collection.

A pair of Nilgi antelope were being kept together. The male became vicious and attacked his mate, tossing her high into the air with his horns, puncturing the abdomen with one horn, allowing a loop of intestine to protrude some six or eight inches. This animal was given an anaesthetic (chloral hydrate); when sufficiently under the influence of the anaesthetic she was turned onto her back on a bed of clean straw that had been moistened; the wound was cleansed and made aseptic as possible, the intestine returned to the abdominal cavity, the peritoneum sutured with a cat gut suture, the muscular wall sutured in the same way,

the skin sutured with silk; an antiseptic pad was placed over the wound, and a girdle of twelve inch adhesive tape wound several times around the abdomen. This animal's temperature was taken regularly for several days. There being no rise of temperature the dressing was left in place for ten days, after which it was removed and the sutures in the skin removed. A perfect healing was the result. In this case, as in all surgical cases, a liberal dose of tetanus antitoxin was given. This animal has since given birth to a fine pair of calves and raised them.

VETERINARY SERVICE ESSENTIAL

One thing I should have mentioned before; that is the habit that so many keepers have of promiscuously giving worm remedies to animals in their charge without knowing whether or not they are infected with worms. This habit is just as silly as it would be for any of you to call the fire department to your house and having the furniture, etc., ruined without there being a fire. If an animal is suspected of being infested with worms the feces should be examined to determine if there are any parasites present and what kind they are, then treatment can be intelligently prescribed.

Now let me briefly summarize why I believe that veterinary service and supervision should be had for all zoological collections of animals:

1. For the inspection and observation of

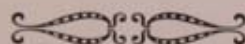
all animals added to the collection, no one should be better qualified to do this than a veterinarian.

2. For the regular inspection and observation of all the animals. This should be done regularly. This gives one a chance to get acquainted with the peculiarities of the different animals, and it will be noticed so soon as one is not normal. We must remember that prevention of disease is the all important thing in caring for wild animals. In this again no one should be better fitted than the veterinarian.

3. It goes without saying that no one except a veterinarian is fitted to prescribe for animals, he having made a study of their common ailments and the action of drugs on animals.

4. In the feeding of wild animals in captivity the veterinarian should be better fitted than others on account of the knowledge he has of comparative anatomy, the peculiar makeup of the different kinds of gastro intestinal tracts of the different species of animals.

All the foregoing finally leads up to this: that in the cure and handling of wild animals in captivity we do all that is possible to keep them healthy, rather than treat them after they become sick, which is so difficult. It is much more sensible to keep them healthy than try to heal them when once they become sick.



POLAR BEARS REARED IN MILWAUKEE

By EDMUND HELLER, *Director Milwaukee Zoological Garden*

The zoological garden at Milwaukee is famous among zoos for its home grown polar bears. No other zoo in America or Europe has been able to raise polar bear cubs, although they are occasionally born at such zoos. At Milwaukee, however, every cub born to Sultana, (the mother of all our polars) has been raised to maturity. All are still alive with one exception, Zero, the first cub born who, at an age of nine years, died in the Longfellow Gardens Zoo in Minneapolis (death due to stomach ulcers).

Nine cubs have been born in our zoo and they range in age from Zero, who was nine years, down to the last pair of cubs born December 12, 1929. Sultana is the mother of all these polars and she is without doubt the most valuable polar bear in captivity. Her affection and solicitude for her cubs is intense and she deserves the major portion of the credit for the wonderful achievement of raising polars in captivity. Her cubs, after the first three months you might say, are reared in the lime-light of civilization, right in the glare of hundreds of pairs of eyes of inquisitive, staring people. Sultana has done a wonderful work and she is the pioneer of her species to introduce and rear cubs in the soft climate of civilization, far removed from the stimulating cold of the Arctic regions.

Some nineteen years ago, at the tender age of eight months, Sultana was brought to the Milwaukee Zoo with three males of her own age. These four polar cubs were captured on the coast of Greenland by a Norwegian fishing fleet which brought them straight to New York harbor and landed them there in July. They were wild caught specimens secured during the months of May or June, when five or six months old. When received in August at Milwaukee they were nine months of age and weighed about fifty pounds apiece.

Cub bears are good-natured and playful

and this group of four polars lived happily together. Every day their keeper brought them large loaves of bran bread to eat, also many fresh "herring" from Lake Michigan, bunches of carrots, and several meaty dog biscuits. A few dried salt fish were also added to their daily rations. In summer, they received baskets full of fresh green grass which they ate with a relish during the early summer for a period of one month. Another delicacy, which they particularly liked, was cod-liver oil which they received one a week the year round. Their playground was a large yard fifty feet long and forty feet wide with a cave or dark den forty feet in length by ten feet in width and eight feet in height built into the back wall. In this dark den the bears could retire at any time to sleep or hibernate, free from the prying eyes of people. A large swimming pool twenty-five feet long and fifteen feet wide and eight feet deep was a source of great delight to them, and in its waters they dove and swam every day, both summer and winter. In these ample quarters the four bears lived together for eight happy years, Sultana associating with the three males, Silver King, Clown, and Borealis. Silver King was the master of this group and he alone mated with Sultana. The other two males accepted the law of the wilderness world that "none but the brave deserve the fair." They did not fight battles with Silver King after once he had established his superiority over each one of them, but kept discreetly aloof whenever he showed fight. They spent their days playing together or swimming in the pool.

Polar bears are slow to reach maturity and it was not until Sultana was eight years old that she manifested any interest in acquiring a family. Polar bears, although they live farthest north of any species, do not hibernate but remain active all winter catching seals and fish along the open sea



SULTANA AND HER CUB NANOOK (age four months)

at the edge of the ice. The female polar, however, is an exception to this rule when pregnant, and she then hibernates and brings forth her young. In the Arctic the cubs are born in some ice-clad cave or hole dug at the base of a cliff, the entrance of which is blocked by snow. In such a cave or den the mother spends four or five months nursing the cubs until they are strong

enough to follow her on her fishing adventures. The mother polar, in her home in the Arctic, does not allow any male polar bear to come near her cubs. She lives aloof from her own kind and devotes all her time to her cubs. For one year and four months she stays with the cubs day and night and is ever ready to defend them against all odds. She is minutely careful not to crush

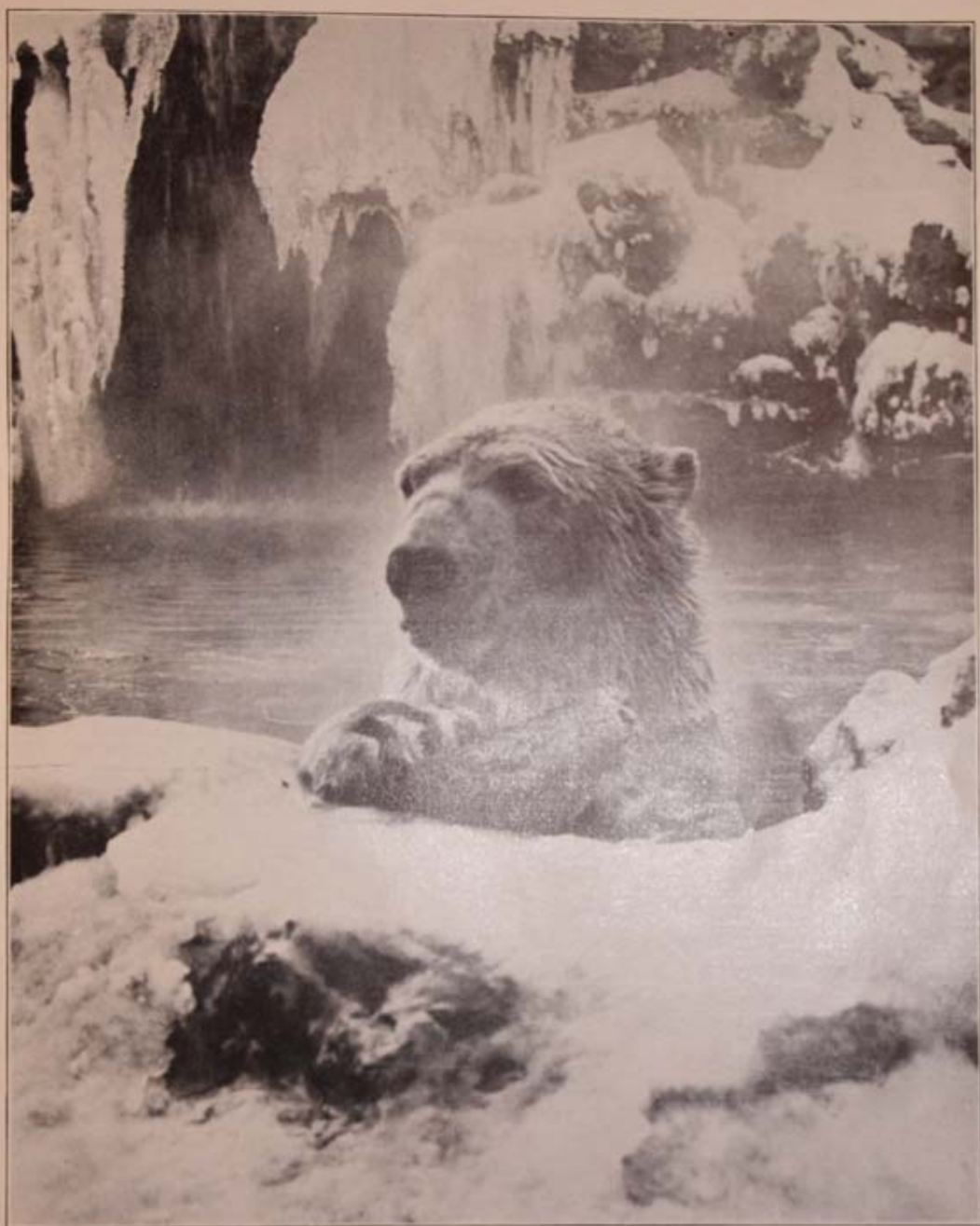
the cubs which weigh only two pounds at birth and are blind for the first thirty or forty days. At the end of the second spring, however, when the cubs are a year and four months old, the mother abandons them and mates again. At this age the cubs are large, robust animals weighing two hundred pounds apiece. They have learned to swim and dive and are experts at catching seals and fish on which they feed. During the mating season, about April of the second year, the mother drives her cubs from her. Their sadness at the hostility of their mother at this time is pathetic and almost heart-breaking. The sad day comes when every animal must make its own way in the world. The cubs are not entirely alone, however, for they have each other for companions, or if single they can join other abandoned cubs of their own age and spend the four or five years until they attain maturity, in catching seals and fish, and in play. They can escape by running or swimming, from any dangerous old males of their own species. Other enemies, except man (usually in the form of Eskimos), they have none.

Coming back to our early history of Sultana, we find that in the fall of 1919, she first went into hibernation in the den and it was then suspected that she would bring forth cubs. The male polars were carefully excluded from her den so she would not be disturbed. By listening at the door of her den, Charlie Stanke, the veteran keeper at the zoo, heard the cries of a cub on December 2nd, and reported the good news to the director, Edward Bean. The birth of polar cubs was an event the director had waited for for many years. He gave orders that Sultana was not to be disturbed and that nobody was to even attempt to view the cubs or open the doors of her den. Sultana was allowed to use her own judgment in rearing her cubs, and not until three months later, early in March, was the cub first seen when Sultana proudly, but timidly, allowed the cub to come to the entrance of the den and look out into the

small yard with its diminutive pool of water which was all the world to be seen from the den's mouth. Sultana stood over the cub in a defensive attitude, glaring at the lucky crowd who were the first persons to ever see a polar bear cub reared in captivity. Gradually each day, as the cub grew stronger and more accustomed to zoo visitors, Sultana's worries became less and her fierceness abated.

Two years after the birth of Zero, Sultana gave birth to twin cubs. They were born November 24, 1921, the earliest date at which any of our polars have been born, all the others being December babies. The twins were a pair, the male we have named Greely and the female Niobi. They are nine years old, and Niobi, last year bred for the first time. Her two cubs, which were both males, were born December 4, 1929. This was a very happy event at the zoo and one we had long looked forward to. Here was the second generation breeding and Niobi was apparently as good a mother as her mother Sultana. Luck, however, was against her and on the twelfth day her flow of milk ceased and the two cubs starved. After a day of silence from the cubs, Charlie looked in at Niobi's den and found the two cubs dead. We suspected they had starved and Dr. Swindle's diagnosis confirmed our suspicions. Niobi showed distinct signs of sadness and nervously looked about for her babies in every nook for several days after the dead cubs were taken from her. The cubs weighed two pounds each and had gained no weight in the twelve days they lived on a starvation diet. They were blind at this stage, their eyes being tightly closed. She did not maul the cubs or eat any part of them, as they were unscarred. Bears often eat their young at birth or a few days after and this has been the sad fate of many polar cubs in other zoos.

To continue with the history of Sultana's offsprings, two more cubs were born on December 2, 1923. They were both males and we named them after Peary, the Polar discoverer and "Bob" Bartlett, his naviga-



BOREALIS DOES HIS DAILY DIVE ON NEW YEAR'S DAY

tor. Both of these cubs are still going strong and are now seven years old and fully adult, and weight about seven hundred pounds each. Two years later, on December 2, 1925, a single cub was born, a male. This cub, when one and a half years old, was sold to the zoological garden at Duluth,

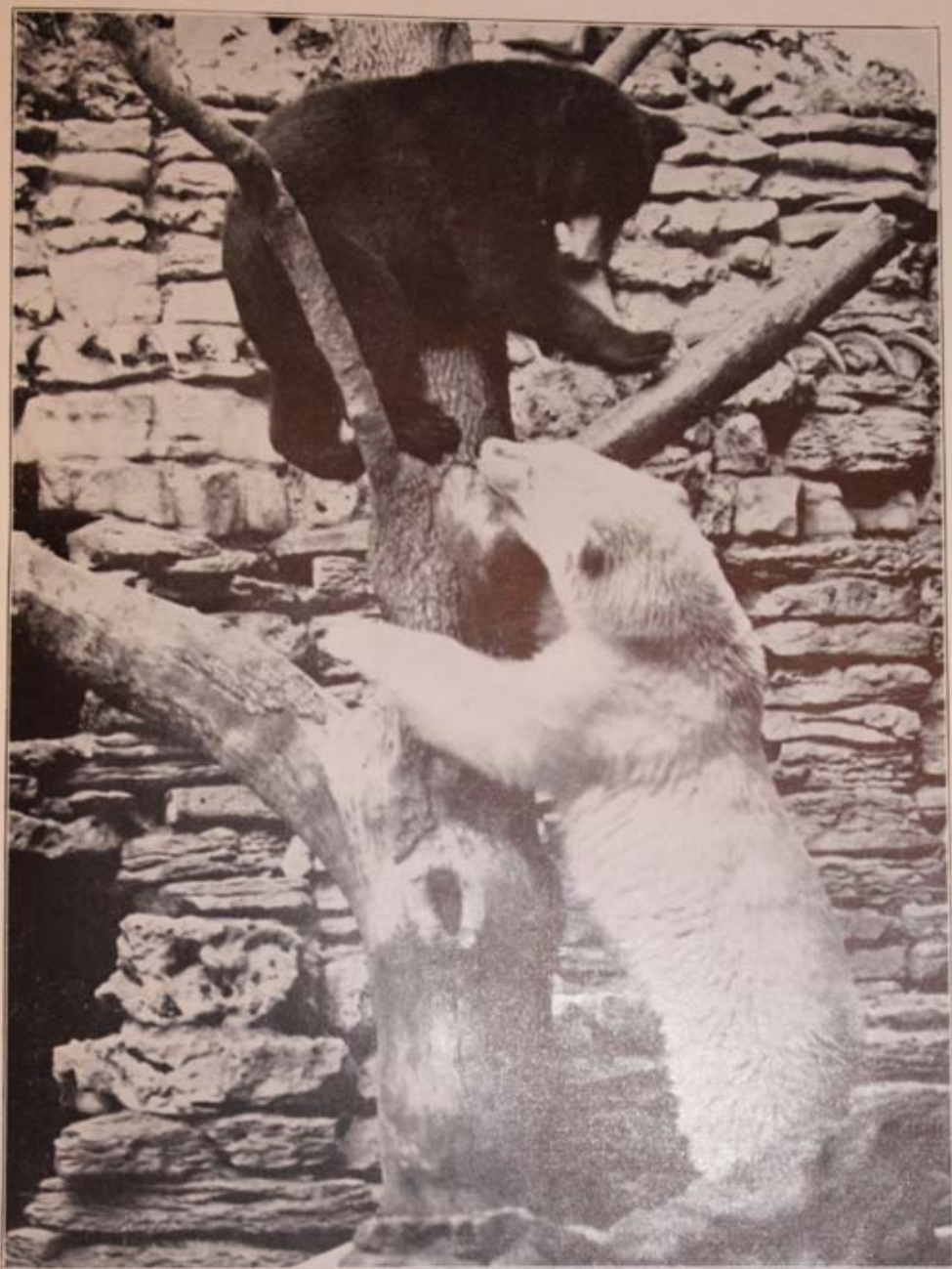
Minnesota. The director, Mr. Onsgard, has recently written me that this polar now weighs eight hundred pounds, but this estimate I should say is quite optimistic, and perhaps it should be reduced one hundred pounds. At last another female cub was born on December 5, 1927. She was un-

fortunately a single cub, but to us her sex made her quite as valuable as two males. Some day we are sure she will be the mother of a large family. Her mother Sultana mated again last April, and so Nanook (as she has been named) was associated with a group of cub bears of her own age, but of different species. Two of her companions are male and a female grizzly, and two are American black bears also a male and a female. There are also a pair of yearling grey wolves in the yard with the cubs. These seven animals were all born in the zoo and are of the same approximate age. They are exceedingly playful and good-natured and have lived together a year without any fight taking place. Even at feeding time there are no quarrels, although the bread, meat, and fish, and carrots are thrown promiscuously to them. Nanook is now about three hundred and fifty pounds in weight and is larger even than the grizzlies, and being the only representative of her species she keeps slightly aloof from the others like a fair white lady who feels her social position weakened in mixed black and tan society. Being a polar she looks upon the swimming tank as her own special bath tub and whenever one of the grizzlies splashes around in the water she eyes his clumsy efforts at swimming disdainfully and sometimes even woofs her disapproval. However, she can't oust a grizzly by merely looking daggers or woofing. He keeps possession of the pool as long as his *Ursus horribilis* disposition desires to. Our cub bears are good-natured in mixed society and being really intelligent, they engage in no fierce battles but only in playful mix-ups.

Nanook's early history is interesting. She was born December 5th, but she appeared for the first time at the entrance of the den on February 15th, when she was two and one-half months old. At that time her mother was out in the yard feeding and she had merely followed her. Her steps were very wobbly and she looked out timidly for a few moments only and then tottered back into the darkness of the den. Her

mother, Sultana, had remained with her every minute from the time she was born until she was three weeks old. Then Sultana was seen for the first time in the yard where she accepted a few fish and some bread and hurried back. A few days later Sultana again appeared at 4 p. m., at feeding time, but only stopped a few moments outside. When, however, the cub was beginning to learn to walk at the age of two and one-half months, she came out daily, followed to the mouth of the den each time by little Nanook. On May 17th Sultana and the cub were placed in a large yard which had a large swimming pool. In the pool her mother plunged and swam daily, but Nanook was afraid of the water. Though six months old and weighing about forty pounds, the water seemed awfully dangerous to her. Nanook's worries were intense when her mother went swimming. As her mother dove out of sight in the water, Nanook would rush nervously around the pool's rim peering down into the water with the saddest look in her black bead-like eyes. When her mother's head appeared again, she was greatly relieved and she would lean over the side of the pool and try to rub noses with her amphibious parent. Every day for the next two months these sort of maneuvers took place when Nanook's mother swam in the pool. However, at last Nanook could stand it no longer, she had hesitated long enough, and on July 23rd she took her first plunge. When she discovered that the splash in this new element had not actually killed her she scrambled out hurriedly after paddling awkwardly about for a minute or two. Each day thereafter she took a longer and longer swim with her mother who watched her carefully and when she grew tired, gently lifted her out with one of her great paws onto terra firma. After a month of such lessons she liked the water so well that she went swimming oftener than her mother. In August she learned to dive and discovered it was great fun.

It seems like base libel to call a snowy blonde female polar bear Sultana, somewhat



POLAR CUB "AMUNDSEN" AT PLAY WITH A BLACK BEAR

the same type of humor as referring to a negro as "snowball," but her name is of long standing and her fame as the mother of the polars has made her well known. All the Sultanas I have seen in Africa were the black wives of black chiefs, but they are called Sultanas chiefly by courtesy. The

real original Sultanas of Arabia are often quite as yellow as a lady polar bear in the spring when she first comes out of hibernation. However, as long as the names of our Arctic heroes hold out, we will apply them to our growing colony of polars.

Statements seen in some of our zoo books

that polar bears do not swim in the icy waters of mid-winter, but confine their swimming to the good old summer-time, are quite untrue. Our polars swim regularly all winter, no matter how cold the weather. The supreme test of whether an animal is comfortable or not in any climate is breeding, and in Milwaukee the polar bears have bred successfully over a period of twelve years continuously. Polar bears are also here able to keep up their vitality over long periods. Borealis was never allowed to breed while Silver King was alive, but when Silver King died, Borealis at once assumed the role of father (then at the advanced age of eighteen years) and fathered both Sultana's and Niobi's cubs. He bred for the first time last year. Silver King's death was due to hydatidosis. The disease is due to the cysts of a species of bladder-worm which entered the lung cavity and caused pleurisy and paralysis. This parasite is commonly carried by house rats which are captured and eaten by zoo bears whenever opportunity offers.

This original stock of polars should be kept at the Milwaukee Zoo until they succumb of old age. They have well earned such consideration, for they have taught the zoo world all it knows at present of the breeding habits and rearing of the young and they will continue this good work if properly cared for here. It will also be interesting to discover to how great an age a polar may attain and at what age they cease breeding, facts which today are not known.

PROGENY OF SILVER KING AND SULTANA

1919, Dec. 12—Male Zero. Sold to Longfellow gardens, May 1, 1922. Died there March 12, 1928.

1921, Nov. 24—Twins, Male Greely, Female Niobi. Living in Milwaukee Zoo.

1923, Dec. 2—Twins, Males Peary and Bob Bartlett. Living in Milwaukee Zoo.

1925, Dec. 22—Male. Sold to Duluth Zoo, May 19, 1927. Living in Duluth Zoo.

1927, Dec. 5—Female Nanook. Living in Milwaukee Zoo.

PROGENY OF BOREALIS AND SULTANA

1929, Dec. 12—Twins. Sex not yet determined. Living in Milwaukee Zoo.

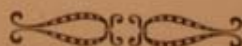
PROGENY OF BOREALIS AND NIOBI

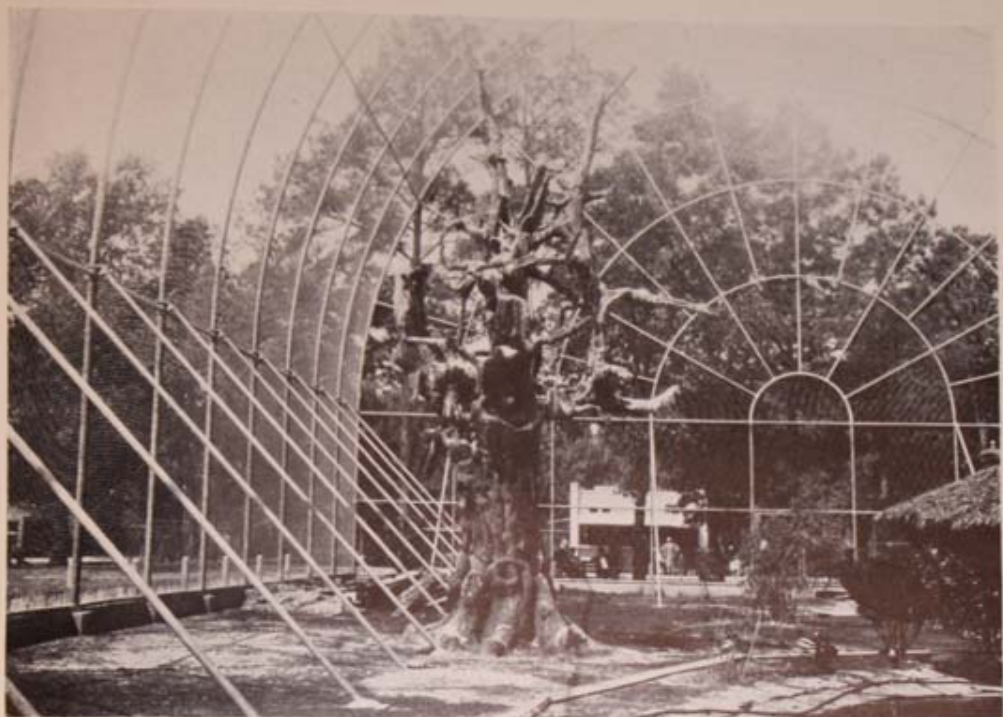
1929, Dec. 4—Twins, Males. Died on 12th day due to starvation.

NOTE: Under date of January 18, 1932, Mr. Heller furnishes some additional information in regard to the polar bear progeny. Of the two cubs born December 12, 1929, one is a male named "Amundsen" and the other a female called "Marie Peary," after the daughter of Admiral Peary, who was born in the Arctic during one of her father's expeditions.

At the present time Sultana is nursing cubs in her den but as she is always left undisturbed to bring them out in the spring, the number or sex is not known. They were born December 5, 1931.

Nanook is now actually larger than her mother Sultana, weighing at least 550 pounds. She is now living with a mixed group of her own age consisting of a pair of grizzlies, a pair of black bears and a pair of great grey wolves. She has lived with these two and one-half years and all sleep together in one large den.





ARTIFICIAL OAK TREE IN FLYING CAGE AT HOUSTON, TEXAS



ORNAMENTAL CONCRETE SEA LION POOL AT HOUSTON ZOO

PUBLIC AQUARIUMS OF THE UNITED STATES*

By ALVIN SEALE, *Superintendent Steinhart Aquarium, San Francisco, and Chairman of Committee on Aquariums, American Association of Zoological Parks and Aquariums*

During the period between September 25 and November 26, 1929, it was my good fortune, through the kindness of the executive officers of the California Academy of Sciences, to visit all of the public aquariums in the United States.

This was not so difficult an undertaking as one might expect, there being but twelve in the entire country. Add to these the one in Honolulu and one in Manila, both of which I had previously visited, and we have fourteen as the grand total under American control.

There is about the same number in Europe, of which Naples seems to be the best known as New York is undoubtedly the best known in this country.

The American aquariums named in the order of the number of exhibits carried and general attractiveness at the time of our visit would be as follows: Steinhart Aquarium, San Francisco; New York, N. Y.; Philadelphia; Manila; Boston; Honolulu; Detroit; Lincoln Park, Chicago; New Orleans, La.; U. S. Bureau of Fisheries, Washington, D. C.; La Jolla, California; Miami, Florida; Long Beach, California; Buffalo, N. Y.

The above designation of position is arbitrary and represents purely a personal opinion at the time the aquariums were visited. Without doubt these positions change from time to time with the change of administration, arrival of additional shipments of specimens, etc.

Almost all of the aquariums show some one thing particularly well or have one or two especially good exhibits. As, for example, no aquarium has such a fine exhibit of gar fishes as may be seen in the New Orleans aquarium; none has a more inter-

esting tank of large sharks and shark suckers or big groupers as the New York Aquarium. Philadelphia has by far the finest exhibit of angel fishes. Manila surpasses all the American aquariums in its exhibit of salt water tropical fishes, closely followed by Honolulu. In the United States proper the Steinhart Aquarium, San Francisco, has by far the best exhibit of tropical fishes, sea horse, trout and invertebrates. Detroit has the best exhibit of muskallunge. Lincoln Park has the best display of small tropical fresh water fishes. Boston has the best display of morays. While at Miami is the only aquarium where live manatee can be seen.

One can readily see why a small aquarium with limited funds and a few tanks should specialize on some one, or at least a very few exhibits. But it should be the ambition of all the large cosmopolitan aquariums to make each particular exhibit equal to or better than can be found in any other aquarium. In this way a friendly rivalry could be arrived at that would be of great benefit to all aquariums.

To judge by appearance, all of our public aquariums are still in the kindergarten stage in so far as attaining perfection in exhibiting is concerned. It is to be hoped that the new Shedd Aquarium in Chicago, with its great resources will mark a distinct advance along this line, when it is open to the public.

In visiting these public aquariums the writer has a list of fourteen questions to which he endeavored to get satisfactory replies. The majority of these related to technical matters such as metals for valves and pumps, feeding, heating, lighting, filtering and general maintenance. There were, however, three questions of public interest which were perhaps of even greater importance and which we will now consider. These were as follows:

*Reprint from PARKS & RECREATION, May-June, 1930.

1. What is your general impression of this aquarium as a whole?
2. What is its best feature or exhibit—why?
3. What in your opinion would effect the greatest improvement and add most to the instruction and enjoyment of the visitors to these aquariums?

I should dislike very much to put into print my notes regarding the first question, also it might not be safe! It seemed, however, that, with the exception of two or three, all our public aquariums lacked something; perhaps the word "pep" would express it better than any other. In keeping things clean, orderly and up to the mark none of the aquariums could compare with Henry Ford's engine room at Detroit. Question No. 2 has already been answered in part, so we shall consider question No. 3. What in your opinion would effect the greatest improvement and add most to the instruction and enjoyment of the visitors? This seems a safe subject for discussion. We wish, however, to emphasize the statement that this is merely our personal opinion, offered in the spirit of constructive suggestions. How far an opinion may be from correct was vividly brought before me today when a visitor from Kansas remarked: "Golden Gate Park would be a beautiful place if you would take a roller and flatten out all the hills"! With this in mind we shall take up the various aquariums in the order of our visit.

The greatest improvement in the Detroit Aquarium that could be made would be to remove the noisy, smelly sea lion from the building and place it in the zoo, where it undoubtedly belongs. This same suggestion holds true for New York and Boston. In all of these aquariums the ear-splitting blat of the sea lion is the most noticeable thing on entering the building. It is continuous, disagreeable and distracting. If sea lions *must* be kept inside of a building let it be in a zoo where one expects more or less noise from animals. If they are an insepara-

ble part of an aquarium, let them be provided with a sound proof annex.

Note: Some copy left out here.

be made is for cleanliness. And, this holds for all public aquariums, including our own. Not enough attention is given to keeping everything CLEAN; and this applies to the building, tanks and everything in the institution. With one or two exceptions none of our aquariums keep their tanks as clean as they should be, or the water as clean as it should be.

The next suggestion for improvement is in regard to the control of the public. Detroit Aquarium has a rather unsightly and useless fence running through the center, and the entire length of the corridor. Boston, Philadelphia and New York have a big iron railing in front of all the tanks. We were informed that this was absolutely necessary in order to keep people from crossing from one side of the corridor to the other or to keep them away from the glass. When I asked why the public should not be allowed to pass from one side of the corridor to another, or to go close to the glass if they so desired, there was no satisfactory reply except the stereotyped one inherited from Europe "that the public must be kept in order," and, "they would damage the glass."

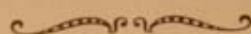
Now what are the facts? At Steinhart Aquarium we have operated since opening in 1924 with more than a million visitors each year through the building, with an attendance of 15,000 to 25,000 on Sundays and holidays. We do not have any fence, nor do we have a railing in front of any tank. There is not a single sign in the building, telling people what they may or may not do. They do not even check their canes. And, we have not had a single case of vandalism or disorder or destruction, and only two drunken visitors in our six years of operation. San Francisco is a seaport city and is not regarded as being particularly angelic. Right here I would like to say a word for the "public." The people who make up the public that visits our aquariums and museums are the ones who pay the bills for

operating and maintaining these institutions. All but a very few are intelligent and very well behaved. So why should they be required to stand back of an unsightly railing, from which position some of the most interesting acts of the fishes and invertebrates are absolutely invisible.

In some places, where vicious people frequent an institution, bars may be excusable. A good policeman, however, is more effective and less expensive. In the majority of cases I believe signs, fences, railings and such things are useless, ugly and frequently suggest the very thing they are supposed to prevent. I noticed in one large institution more damage had been done to the glass

by an ignorant employe than had been done by the public in all the combined aquariums of the United States.

But the greatest improvement of all could be effected in all aquariums now under political control by freeing them entirely from park boards and all such bodies of political nature and placing them under non-political, scientific societies or associations. This is well proven by the growth and improvement in the New York Aquarium since being placed under the New York Zoological Society, and by the progressive condition at Steinhart Aquarium which, since its foundation, has been administered by the California Academy of Sciences.



THE JOHN G. SHEDD AQUARIUM

The John G. Shedd Aquarium is located in Grant Park, Chicago, on the shore of Lake Michigan about a mile from the famous "Loop" district, which is the center of civic activity.

Octagonal in shape, the exterior of

Georgia marble, the building consists of a main floor, a basement, a basement mezzanine and a central tower which rises to a height of 100 feet. Only the ground floor is open to the public, however, the exhibits being so arranged that they may



JOHN G. SHEDD AQUARIUM



PORTION OF BALANCED AQUARIUM ROOM, JOHN G. SHEDD AQUARIUM, WHERE TROPICAL FISHES AND GOLDFISHES MAKE THEIR HOME

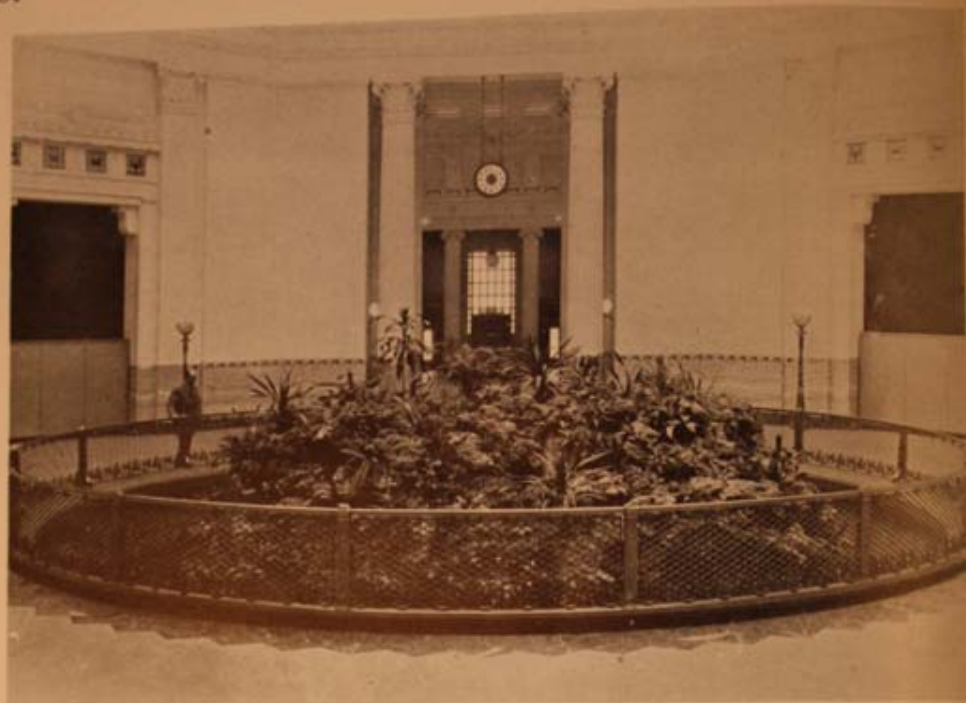
all be seen without climbing any stairs or retracing steps.

The Aquarium proper is 300 feet in diameter, exclusive of the terrace, which is 30 feet wide. After passing through the front vestibule, the visitor enters a spacious marble foyer hall which, in turn, opens into an octagonal rotunda, also of marble, in the center of which is a 40 foot pool. This pool is arranged as a semi-tropical swamp. Radiating from the rotunda there are six main exhibition halls, each 30 feet wide and approximately 90 feet long. On one side of the foyer hall are situated the executive offices and lecture hall and on the other side is a "Balanced" aquarium room.

There are 132 permanent wall tanks lining the walls of the main exhibition halls. They vary in capacity from 375 gallons to 13,500 gallons. Special care has been taken in lighting these tanks. The skylights are so arranged that the visitor views the fish

by means of reflected light. The largest tanks are 30 feet long, 10 feet wide and hold 6 feet of water. There are in addition, 95 reserve tanks, as well as a number of portable tanks. The total capacity of all the permanent tanks in the building is about 500,000 gallons. Water is supplied from four reservoirs in the basement, the total capacity of which is 2,000,000 gallons, half of which is salt. This salt water was brought from the ocean at Key West, Florida, in 160 railroad tank cars. The fresh water is pumped direct from Lake Michigan.

All of the pumps used are of the centrifugal type, electrically driven. The Aquarium piping, which is antimonial lead throughout, is divided into five separate systems, heated and refrigerated salt water and heated, natural and refrigerated fresh water. About 30% of the tanks are double piped so as to allow such adjustments in the number of tanks in each system as are neces-



THE 40 FOOT SEMI-TROPICAL POOL IN OCTAGON HALL, JOHN G. SHEDD AQUARIUM, WHERE FROGS, TURTLES, SNAKES AND A FEW FISH MAKE THEIR HOME

sitated by the character of the specimens on hand.

Of special interest is the "balanced" aquarium room. This is decorated in colorful Japanese style to represent an open air courtyard, lighted by eight large lanterns, each on a bamboo post. It is octagonal in shape, with a central kiosk in which fancy goldfish are exhibited. The main walls of the room contain 65 smaller aquariums which are planted with aquatic plant life and in which tiny tropical fishes are exhibited. An innovation in this connection is the use of the new "Violet Ray" glass in all the skylights to insure a proper growth and a more faithful rendition of color. Other interesting features are a small lecture hall, a hatchery and scientific laboratories.

Included in the regular equipment of the Aquarium is a specially built railroad fish car which, in effect, is a traveling aquarium. This is used for transporting fishes from the collecting grounds to the Aquarium. To

insure rapid handling of the specimens at the Aquarium there have been provided a driveway into and around the basement, electric elevators and hoists and an overhead tramway which delivers the fishes, still in their traveling containers, direct to the aquarium tank in which they are to be exhibited.

The John G. Shedd Aquarium exhibits fishes, and other aquatic life, from every part of the United States, as well as a number of foreign species. In addition to the regular exhibits, it is expected that the Aquarium will send special expeditions to secure specimens hitherto unknown to public aquaria.

This splendid institution was made possible by the late John G. Shedd, who donated \$3,000,000 to the people of Chicago for the purpose. The Aquarium is operated and controlled by the Shedd Aquarium Society. Funds for future maintenance are assured by a small tax levied by the South Park District of Chicago.

THE STEINHART AQUARIUM AT SAN FRANCISCO

By ALVIN SEALE, Superintendent

The approach to Steinhart Aquarium is through an open court in which are five large pools. Two of these are filled with turtles, forming attractive features of the front wall of the building on each side of the entrance. The three large pools in the court, each with a swimming space of 80 feet, contain fur seals, sea lions and leopard seals. These are a source of great interest to all visitors.

Upon entering Steinhart Aquarium one is impressed—first, with the beauty of the interior of the building; second, by the number and diversity of the exhibits. A large swamp directly in front forms one of the most interesting and striking features. In the water or among the plants and vines of the swamp one discovers, gradually, alligators, snakes large and small, gigantic bullfrogs, salamanders, turtles and fishes of many species. The water enters the swamp by a moss-grown rocky spring and trickling fall. It is warmed up to 74° Fhr. In the planted area surrounding the swamp are a number of balanced aquariums with attractive exhibits of small tropical fishes. Half of these tanks are devoted to marine invertebrates, where wonderful sea anemones, starfishes, mollusks, and many other beautiful forms of seashore life are displayed.

Extending out from each end of the entrance vestibule are the long exhibition corridors with their large glass-fronted tanks. These have an abundance of overhead light and exhibit to good advantage fishes, sea turtles, giant salamanders, numbering in the total 130 exhibition tanks and aquariums with something over 8,000 specimens of animals.

EXHIBIT TANKS

The largest tanks are 8 feet long, 7 feet wide, and 4 feet high; others are 6 feet long, 6 feet wide, and 4 feet high. These are all of cement 4 inches thick, well reinforced, and the finishing coat well trowelled.

These tanks should be made in batteries of three, with expansion joints to allow for shrinkage. The bottom of the tank should not be over 30 inches from the floor. The front of each tank is 13/4 inch plate glass set from the inside against the cement front frame, formed as a part of the tank. A rubber gasket 1" by 1/2" which may be stuck to the cement by glue until the glass may be put against it. Around and under the glass should be filled with aquarium cement; great care must be taken to have the front against which the glass sets an absolutely true surface. The glass is held in place by a 3/4" quarter round of cypress wood and the pressure of the water.

Each tank must be provided with a valved outlet from the bottom which is pitched to drain to this outlet. There must also be an overflow 8 inches from the top placed above the line of observation from the front of the tank.

CIRCULATING SYSTEM

The Steinhart Aquarium is operated with a closed system of circulation, the same water being used over and over again indefinitely. Four kinds of water are kept in constant circulation, as follows: Salt water warmed to 73° Fhr. for the Hawaiian fishes; salt water of normal temperature for California sea fishes; fresh water cooled to 50° Fhr. for trout and fishes from localities with a low temperature; normal fresh water for the fishes from the ordinary lakes and streams.

This involves four distinct systems of pumps, filters and pipes. Each kind of water is pumped from a cistern under each filter to a tank on the roof. It then flows by gravity through the exhibition tanks, then through the filters and back to the cistern to be pumped again to the roof for recirculation.

The machinery for circulating, heating



OPEN COURT IN FRONT OF STEINHART AQUARIUM SHOWING THE SEA LIONS AND FUR SEAL POOLS

and cooling the water is centralized in a single engine-room. All superfluous and duplicate machinery has been eliminated. All pumps are standardized and cross-connected. If one pump is out of commission one of the other pumps can do its work temporarily until repairs or replacements can be made.

The piping for circulating the salt water is of extra heavy lead with Monel valves and fittings. The overflow from each exhibit tank discharges into a manifold from which the water may be diverted into any of the systems or to the sewer. This gives an absolute control of each tank as a separate unit—a most important point, not usually realized until an epidemic starts in an aquarium.

All pipes for the tanks are placed in a pipe-trench, which is easily accessible for repairs or cleaning out.

STORAGE, RESERVOIRS AND TANKS

The entire water supply is run into a 100,000 gallon underground storage reser-

voir which is of cement and divided into four compartments with valved by-passes into each compartment at the center. One of these is for each kind of water used. These must each have a washout line and be pitched to drain to that point. In the tank house on the roof are four wooden tanks lined with cement, each holding 2,000 gallons, one for each temperature of water circulated. One of these tanks contains the cooling pipes of the cold water system. Another contains the heating outfit to warm the water. This is simply a large domestic water-heater covered with sheet lead and having a steam coil within. Each of these tanks has a float which operates an electric switch and automatically starts and stops the pumps.

FILTERS

As four kinds of water are circulated there are four filters, each of cement 6'x 6'x 5' with open top easily accessible. Each of these has four feet of sand and gravel. The



THE SWAMP IN THE VESTIBULE OF STEINHART AQUARIUM. THIS CONTAINS ALLIGATORS, CROCODILES, TURTLES, FISH AND FROGS

water is collected at the bottom by a branched spider of lead pipes set in the cement at the bottom of each filter, and each pipe cut one-half through by a fine hack saw in innumerable places. These cuts must not be large enough to admit sand, but must admit water freely. The plumbing on each filter is so arranged that the direction of the water may be reversed and thus wash all dirt to the top and clean the filter. Therefore the top surface must have a large drain into the sewer. Filters must be washed once each week. Each filter has a 1,000 gallon pumping cistern directly below, which also has washout and is pitched to drain.

PUMPS

There are four direct-connected motor-driven centrifugal pumps, all exactly alike. Each pump will discharge 70 gallons per

minute against a suction of 14 feet and a head of 50 feet.

Each pump is of Tobin bronze with Monel metal shafts, bearing and glands; motor and pump each fastened to a single cast-iron bed plate and connected by a pin flexible coupling. Motors are Westinghouse, 50 degree, 5 H. P., 60 cycle, 220 volt induction, not over 1750 R. P. M. Each motor is operated by an open tank float switch in storage tank in tank room.

Pump 1-2 have valved discharge into fresh water roof tank, cooled fresh water roof tank and sewer. Pumps 3-4 have valved discharge into warmed salt water roof tank normal temperature salt water tank and sewer. The suction of each pump has a valved connection with one of the pumping cisterns under the filter and to a compartment of the outside storage reservoir. The



MAIN EXHIBITION CORRIDOR AT STEINHART AQUARIUM, TOTAL LENGTH 290 FEET

pumps of the two fresh water systems are cross-connected so that by using a hand switch and adjusting the valves, the water may be pumped from or into either of the two systems, which saves buying two extra pumps. The same is true of the two salt water systems.

AIR SUPPLY

One good air-compressor, such as is used in gasoline stations for inflating auto tires, is necessary. This is connected with a three H. P. motor. Half-inch pipe should extend from this to all tanks and to the filter for cleaning purposes, and to supply air in case of a failure of the water circulation. If there is a probability of the electric current going off frequently this air pump should also be connected to a small gasoline engine as an emergency measure.

HEATING

The building is steam heated throughout

by the low pressure boiler system, using oil as fuel. Extra radiators and steam pipes are installed where extra heat may be required.

LIGHTING

The light into the exhibition corridors comes through the tanks. The entire area over the exhibition tank and over the swamp is of sky lights. These should be of amber glass or, if of clear glass, must be painted on the outside. An adjustable electric flood-light with a reflector is placed directly over each tank.

VENTILATION

The building is ventilated by large fans which draw the bad air from the corridors, while air ducts from outside the building to the radiators supply fresh air at all times.

Living quarters for the superintendent are provided in the building. The Aquarium has been in constant operation night



BALANCED AQUARIUMS FOR SMALL FISH AT STEINHART AQUARIUM

and day since September 29, 1923, and has proved to be a great success. The visitors number about 1,000,000 per year.

Steinhart Aquarium was a gift of Ignatz Steinhart and is under the management of

the California Academy of Sciences of which Dr. C. E. Grunsky is president, and Dr. Barton Warren Evermann is director. The city of San Francisco provides the funds for maintenance.



Courtesy N. Y. Zoological Society

THE VASCO DA GAMA AQUARIUM AT LISBON, PORTUGAL



THE NEW YORK AQUARIUM

Courtesy N. Y. Zoological Society



ODENHEIMER AQUARIUM AT AUDUBON PARK, NEW ORLEANS

THE ZOO MUSEUM

Paper by ROGER CONANT, Educational Director, Toledo Zoological Society, before the Annual Meeting of the American Association of Zoological Parks and Aquariums

One of the outstanding services which a zoological park can render to its community is to serve as a bureau of information on animal life and to identify correctly for the curious civilian the specimen which he has chanced to find. Objects ranging from dead snakes and insect cocoons to fossils and Indian relics are frequently brought to the zoo staff's attention with the request that the finder be told what he has. One of the best ways of building interest and good-will toward the park is to be able to name the specimens for the visitor and to tell him in a courteous manner something about it. Such has been the policy at the Toledo Zoological Park and many new friends have been gained in this way.

Almost always the object in question is left at the zoo and very soon there accumulates a collection of odds and ends, some of them worthless and others quite valuable. If the culls be discarded there still remains an assortment of material which if properly labeled and exhibited can become a valuable addition to the zoo's display. The day when the zoological park was simply a menagerie of living animals has long since passed and the public is beginning to realize that the park it supports is in fact a real educational institution.

A zoo museum is the natural way in which to care for inanimate donations and the proper manner in which to begin preparing, for the visitors' information, interesting exhibits illustrating phases of natural history which it is practically impossible to show with living animals. Many instructive details of life histories of insects and small animals may be presented in this way with very little expense and very little effort.

Unfortunately all animals must die, but some of them may be so rare or so expensive as to prohibit their immediate replacement.

For a few dollars a capable taxidermist can change a worthless carcass into a lasting asset. Perhaps he may also be able to save some of the disappointment of visitors who, for example, have traveled long distances to see the ant-eater or bird of paradise which they observed at the zoo last year but which has since died and still remains unreplaced. It is well worth the trouble to preserve some of the specimens lost through accident, old age or disease.

A few small dust-proof cases will suffice at first and once the public learns that specimens are desired there will be no lack of donations. Not everything turned in need be displayed. A storage place for surplus articles can be provided and the donor politely told that there is not enough space at the moment in which to display his offering. The storage room forms an excellent locality from which the worthless and useless junk can conveniently disappear. No matter how little it may be desired, it is best not to offend a person by refusing to accept the curio or knick-knack he has carefully transported from his home.

A representative collection of the animals known to occur in the immediate neighborhood of the city in which the zoo is located is something to be striven for. It is exceedingly valuable to the curator and to the visitor to have on hand a series of carefully identified specimens of most of the common species of the vicinity with which they can compare the most recent donations. A summary of the success which the Toledo Zoological Society has had in building up such a collection is interesting.

During the past summer there has been acquired a nearly complete series of the reptiles, amphibians and fishes known to occur in Ohio and Southern Michigan; these have been preserved with very little



ENTRANCE TO HOUSTON MUSEUM OF NATURAL HISTORY IN HERMANN PARK
ZOOLOGICAL GARDENS

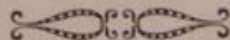
expense in formalin and alcohol. It is planned, in addition, to eventually have on hand in the Toledo collection an assortment of bird-skins, fossils, insects, plants and other groups in which the public shows much interest. The visitor is usually greatly pleased and often expresses surprise when he is shown an exact duplicate in the collection of the specimen which he has caught or found himself.

It is very difficult at times to properly identify certain specimens, particularly in groups where many forms appear much alike. To aid in determining and cataloguing such species a number of citizens, all of them interested in natural history, but specializing particularly in one or more subjects, have been organized into the strong and enthusiastic Toledo Field Naturalists Association. The avowed purposes of this association include the building up of a fine, properly identified museum collection, the securing of a museum to be erected in the zoological park and the teaching of popular natural history to anyone who may be interested. Practically all of the active naturalists in Toledo have become members and among the group are included three college professors. Much of interest can be learned about the life histories and distribution of local plants and animals in amassing such a collection and this information can be passed on to the public through exhibits and through educational talks to the children in the schools. Portions of the material from the immediate neighborhood can be loaned

to teachers and in return the youngsters are encouraged to attend the zoo and the zoo museum. Intelligent children are usually far more interested in the animals and plants they see about them than they are in things from far-away lands. Adults seem to take the opposite viewpoint; the bigger, rarer or more dangerous the animal the better it is.

The Toledo Zoo museum collection, incomplete as it still is, has become already a gathering place for a large number of persons interested in field work, and it is not unusual to find a half dozen high school boys comparing the specimens they have found with the labeled ones in the cases or on the shelves. They have learned to identify most things without assistance and have so fortified their interest and knowledge in natural history as to place themselves far in advance of their classmates. Many adults also make use of the collection and next to actual field work most of them feel that they can learn more about the wild life they may encounter near their homes than in any other way.

It is felt that the development of the museum collection and the organization of the Toledo Field Naturalists Association have done more than any other single thing to stimulate popular interest in natural history and in the zoo. Under the leadership of a man who is interested in all branches of zoology and botany and who has a fair knowledge of the more common species, any other first class zoo can do likewise and can profit in a similar manner.



ZOOLOGICAL PARKS STATISTICS

The following information regarding the zoological parks of the United States and Canada was obtained during the year 1931 and is listed alphabetically by cities. The figures in parenthesis following the name of the city represent population, in most cases taken from the 1930 census.

Changes in the number of exhibits are constantly occurring in zoos and therefore the numbers reported below may differ somewhat from the inventories of the first of the year 1932. A complete list of all the zoos of this country is difficult to obtain as some executives neglect to report and others undoubtedly were inadvertently omitted in sending out questionnaires.

In listing the number of exhibits the following abbreviations are made: Budg. for budget; mam. for mammals; bd. for birds; rept. for reptiles; amph. for amphibians; sp. for species; perm. for permanent; bldgs. for buildings; kprs. for keepers; mtce. for maintenance.

Avalon, Calif.—*Catalina Island Bird Park*. Owned entirely by Wm. Wrigley, Jr., this strictly bird park is open daily with a free admission. The park covers $7\frac{1}{2}$ acres and the annual operation budget is \$30,000.00. Exhibits—3,800 bd. of 378 sp. Employees—4 kprs., 3 mtce. E. H. Lewis, Superintendent.

Birmingham, Ala. (257,657)—*Municipal Zoo*. Governed by Park and Recreation Board; funds from city park and recreation budg. Annual operation budg., \$7,000.00. $3\frac{1}{2}$ acres. Exhibits—120 mam., 20 sp.; 201 bd., 16 sp.; 30 rept., 8 sp.; total 351. Employees—1 kpr., 1 watchman. Mtce. and repair by regular park forces. Zoo is old and not permanent, being located in thickly settled district. R. S. Marshall, Superintendent of Parks.

Boston, Mass. (787,271)—*Franklin Park Zoological Garden*. No report received. Parks Manual by L. H. Weir (1928) gives 80 acres. Exhibits—235 mam.; 1,700 bd.; total 1,935. Established 1911. Daniel J. Harkins, Curator.

Buffalo, N. Y. (573,070)—*Park Zoo*. Governed by park commissioner; funds from city tax budg. Annual budg., \$30,000.00. 17.6 acres. Total exhibits, about 300. Perm. bldgs., 1 elephant and 1 bird house. Employees—6 kprs., 2 watch., 2 laborers. Dr. F. A. Crandall, Curator.

Calgary, Alta. (63,305)—*St. George's Island Park Zoo*. Parks Department. Park Funds and

Zoological Society. Budg., \$2,689.50. Exhibits—101 mam., 17 sp.; 237 bd., 58 sp.; 1 rept.; total 439. Outside display. Employees—1 kpr. Wm. R. Reader, Superintendent of Parks.

Cedar Rapids, Ia. (56,078)—*Bever Park Zoo*. City Park funds. No definite budg. 20 acres. Exhibits—30 mam.; 40 bd.; total, 70. Employees—1 kpr. W. F. Volz, Superintendent of Parks.

Chicago, Ill. (3,375,329)—*Lincoln Park Zoo*. Governed by Park Commission appointed by governor. Funds from tax budg. north section of city. Annual budg., \$153,000.00 (1930). $14\frac{1}{2}$ acres. Exhibits—285 mam., 73 sp.; 1,254 bd., 163 sp.; total 1,539. Perm. bldgs.—4 mam., 1 bd. There is also an Aquarium showing 35 varieties of fresh water fish with 600 specimens and 75 varieties of tropical fish with 2,000 specimens. The Aquarium has a hatchery with a capacity of 3,000,000 lake trout, 500,000 lake salmon, 50,000 rainbow trout, 25,000 lock leven trout, 15,000,000 wall-eyed pike. Alfred E. Parker, Director.

Chicago, Ill. (Cook County, 4,500,000)—*The Chicago Zoological Park*. Mail address, Brookfield, Ill. Governed by the Chicago Zoological Society. Supported by taxation from entire Cook County and from Zoological Society. 196 acres. Collection to be acquired just previous to opening of park. Perm. bldgs. to date—7 mam., 1 bd., 1 rept., 6 adms. and service. Employees—varies during construction period. For seven years $\frac{3}{80}$ of a mill on all taxable property in Cook County, approximating \$650,000.00 annually; $\frac{1}{20}$ mill thereafter for operation; also funds derived from soc. membership fees, gifts, all revenues of soc. derived from gate receipts, profits from all concessions, sale of animals, etc. Edward H. Bean, Director; Robert A. Bean, Assistant Director.

Chippewa Falls, Wis. (9,130)—*Irvine Park Zoo*. Governed by Irvine Park Board and supported by city appropriation and an endowment fund. Exhibits—67 mam., 10 sp.; 88 bd., 18 sp.; total 155. Located in 300 acre park. Zoo in charge of park superintendent.

Cincinnati, Ohio (449,331)—*Cincinnati Zoological Park*. Cinn. Zoological Park Ass'n. Private support, deficits made up. Gate admissions, receipts from grand opera and amusement features; not run for profit, no dividends declared; any profits go back to institution. 70 acres. Exhibits—530 mam.; 1,435 bd.; 100 rept. and amph.; total 2,065. Perm. bldgs.—4 mam., 10 bd., 1 rept. Employees—9 kprs., 2 watch., 1 mtce. Sol A. Stephan, General Manager.

Cleveland, Ohio (900,430)—No statistics obtainable. Not affiliated with American Association of Zoological Parks and Aquariums.

Dallas, Texas (260,397)—No report received. Parks Manual in 1928 gave acreage as 36; Exhibits—261 mam.; 750 bd.; 42 rept.; total 1,053; jurisdiction Parks Department. Established 1912. W. F. Jacoby, Director of Parks.

Denver, Colo. (287,644)—*Denver Zoological Gardens or City Park Zoo*. Governed by City and County of Denver and supported by taxation from general park funds. Annual budg., \$20,000.00. 40 acres. Exhibits—146 mam., 39 sp.; 1,336 bd., 148 sp.; 7 rept. & amph., 7 sp.; total 1,489. Has no perm. bldgs. Employees—6 kprs. Zoo was founded in 1896. Collection displayed out-of-doors the year round. Free to public. First artificial mountain of barless design, cast process, for bears. Clyde E. Hill, Director.

Detroit, Mich. (1,573,985)—*Detroit Zoological Park*. Governed by Detroit Zoological Park Commission. Supported for limited time by $\frac{1}{10}$ mill of total assessed valuation of city. Annual operation budg., approx. \$169,000.00 and \$211,000.00 for construction purposes. Covering about 125 acres, it is an outstanding display of the barless type of construction. Exhibits 904 mam., 99 sp.; 328 bd., 117 sp.; total 1,232. Perm. bldgs. and enclosures for mam., 15; bd. 1. Employees—21 kprs.; 2 watch. John T. Millen, Director.

Detroit, Mich.—*Belle Isle Park Zoo*. Governed by Department of Parks and Boulevards. Funds obtained through tax budg. Occupies 24 acres in Belle Isle Park. Exhibits—159 mam., 28 sp.; 311 bd., 37 sp.; total 530. There is a modern elephant house and the zoo includes a very fine aquarium building, displaying native fishes. Employees—6 kprs., 1 watch. John W. Ireland, Curator.

Duluth, Minn. (101,417)—*Duluth Zoological Gardens*. City Council. City taxes for mtce. and operation only. All stock by donation or exchange. Budg., \$24,000.00. 20 acres. Exhibits—145 mam., 56 sp.; 118 bd., 26 sp.; 2 rept.; total 265. Perm. bldgs.—4 mam., 1 bd. Employees—3 kpr., 1 watch, 1 mtce., 1 cook. B. E. Onsgard, Director.

Evansville, Ind. (103,151)—*Mesker Zoo*. Governed by Board of Park Commissioners. Supported by park tax funds. Aided by Zool. Society. Budg., \$10,121.00. 40 acres, in 260 acre park. Exhibits—81 mam., 34 sp.; 89 bd., 21 sp.; 15 rept., 7 sp.; total, 185. Has 3 perm. mam. bldgs. Employees—4 kprs.; 2 watch. In 1931, 10 acres adjoining zoo was leased to private company operating high grade amusement concessions from which zoo received city's part of earnings. Gilmore M. Haynie, Executive Secretary.

Fort Worth, Texas (160,802)—*Fort Worth Zoo*. Gov. by Bd. of Park Com. Sup. by tax funds for parks. Budg., \$10,000.00. 25 acres. Exhibits—107 mam., 35 sp.; 292 bd., 48 sp.; total 399. Nine small perm. bldgs., 3 series cages, 1 flight cage, 2 wildfowl ponds, 2 deer ranges. Employees—3 kprs., 1 watch, 2 mtce., yearly average, 4. Harry J. Adams, Superintendent of Parks. D. V. Killough, Manager.

Great Falls, Mont. (30,000)—*Gibson Park*. Park Dept. Taxes for parks. No report on operation expense. 5 acres. Exhibits principally deer. 1 kpr. Frank Reimer, Superintendent of Parks.

Hershey, Pa.—*Hershey Zoological Gardens*. Managed by Hershey Estates. Free to public. A representative collection of the smaller mammals and birds. One perm. bldg. for mams. Ward R. Walker, Director.

Houston, Texas (289,579)—*Houston Zoological Gardens*. Bd. of Park Com. Approp. from general revenue. Budg., \$32,000.00. 75 acres. Exhibits—234 mam., 825 bd., 71 rept. & amph.; total 1,130. 6 perm. mam. bldgs., 2 bd., 1 rept., 1 museum. Employees—9 kprs., 1 watch, 2 mtce. C. L. Brock, Superintendent of Parks. Hans Nagel, Head Keeper.

Independence, Kans. (14,000)—*Riverside Park Zoo*. Park Board. Park tax funds. Budg., \$13,000.00 for park and zoo. 113 acres. Exhibits—30 mam., 8 sp.; 25 bd., 5 sp.; 4 rept.; total, 59. Employees—2 kprs., 2 watch, park mtce. Monkey island under construction. Ralph C. Mitchell, Mayor, Chairman Park Board.

Kansas City, Mo. (399,484)—*Swope Park Zoological Gardens*. Bd. of Park Com. Tax funds for parks. Budg., about \$30,000.00. 65 acres. Exhibits—130 mam., 43 sp.; 309 bd., 51 sp.; 35 rept. & amph., 3 sp.; total, 474. Bldgs. not reported. Employees—12 kprs., 2 watch, 4 mtce. & repair; yearly average, 14. N. T. Clark, Director.

LaFayette, Ind. (25,000)—*Columbia Park Zoo*. Park Dept. Tax funds for parks. Budg., \$25,000.00. 40 acres. Exhibits—112 mam., 38 sp.; 245 bd., 52 sp.; total, 465. Employees—3 kprs., 2 watch, 8 seasonal helpers. A. W. Clemens, Superintendent of Parks.

Lansing, Mich. (78,421)—*Potter Park Zoo*. Park Board. Tax funds for parks. Budg., \$7,500.00. 5 acres. Exhibits—71 mam., 23 sp.; 122 bd., 20 sp.; 8 rept., 5 sp.; total 201. Perm. mam. bldgs., 2. Employees—2 kprs., 1 watch. H. Lee Bancroft, Superintendent of Parks.

Lincoln, Neb. (75,919)—*Antelope Park Zoo*. City Council with Park Advisory Bd. Tax funds for parks. Budg., \$4,000.00. 5 acres. Exhibits—203 mam., 26 sp.; 107 bd., 11 sp.; 17 rept., 1 sp.; total, 327. Employees—2 kprs., 4 or 5 part time mtce. C. S. Kittinger, Superintendent of Parks.

Madison, Wis. (57,815)—*Henry Vilas Park Zoo*. Park Assoc. City tax funds. Aided by Zool. Soc. Budg., \$28,000.00. 15 acres. Exhibits—312 mam., 95 sp.; 209 bd., 26 sp.; 38 rept., 2 sp.; aquarium display of 100 sp.; total, 659. Perm. Bldgs., 3 mam., 1 bd., 1 aquar. Employees—8 kprs., 1 watch. Fred Winkelmann, Director.

Memphis, Tenn. (252,049)—*Memphis Zoological Gardens*. Park Commission. City tax funds for parks. Budg., \$35,000.00. 30 acres in Overton Pk. Exhibits—427 mam., 36 sp.; 325 bd., 21 sp.; 141 rept. and amph.; total 893. Perm. bldgs., 5 mam., 1 bd., 1 rept. Employees—1 kpr., 1 watch, 10 helpers and mtce. N. J. Melroy, Superintendent.

Miami, Fla. (110,514)—*Opa. Locka Zoo*. This is a private zoo, located in Opa. Locka, a suburb of Miami. Maintained by 10c admission charge. Budg., \$5,000.00 5 acres. Exhibits—

119 mam., 32 sp.; 268 bd., 42 sp.; 141 rept. & amph., 31 sp.; total 528. Open air display of 73 cages. Employees—1 kpr., 1 mtce. G. F. Sirman, Curator.

Milwaukee, Wis. (572,557)—*Milwaukee Zoological Garden*. Board of Park Com. City tax funds. Zool. Soc. aids and purchases all animals. Expended in 1930—\$23,000.00 operation, \$5,000 mtce., \$37,676.49 salaries; \$150,000.00 new bldg., \$6,000.00 animals purchased; total \$221,676.49. 43 acres in Washington Pk. Exhibits—411 mam., 86 sp.; 1,196 bd., 215 sp.; total 1,607. Perm. bldgs.—4 mam., 2 bd. Employees—24 kprs., 4 watch. Edmund Heller, Director.

Minneapolis, Minn. (464,753)—*Longfellow Zoological Gardens*. Privately owned. 4½ acres. Supported by admissions. H. Colby Rowell, Director.

Minot, N. D. (18,500)—*Roosevelt Park Zoological Garden*. Bd. of Park Com. Tax funds for parks. 25 acres in Roosevelt Pk. Exhibits—197 mam., 33 sp.; 165 bd., 33 sp.; 1 rept.; total, 363. 1 perm. mam. & bd. bldg. Employees—2 kprs., 1 mtce. C. A. Wilson, Superintendent of Parks.

New Orleans, La. (455,792)—*New Orleans Zoological Garden*. Audubon Park Com. and N. O. Zoological Soc. Funds obtained from Com. & Soc. Budg., \$24,000.00. 15 acres in Audubon Pk. Exhibits—218 mam., 57 sp.; 479 bd., 101 sp.; 95 rept. & amph., 19 sp.; total 792. Perm. bldgs.—3 mam., 1 bd., 1 rept., 1 aquarium. Employees—6 kprs., 1 watch, mtce. as needed. Additional to above exhibits are 25 sp. fresh, salt water and tropical fish and 6 sea lions in aquarium. Aquarium budg., \$9,000.00. Frank E. Neelis, Superintendent of Audubon Park.

New York, N. Y. (6,981,927)—*New York Zoological Park*. New York Zoological Society. Supported by city budg. approp., income from endowments, membership dues, gate and privilege receipts. Annual operation budg. not reported, varies from year to year. 264 acres. Exhibits (Jan. 1, 1931)—553 mam., 184 sp.; 1,761 bd., 742 sp.; 401 rept. & amph., 84 sp.; total 2,715. Perm. bldgs.—1 adms., 12 mam., 3 bd., 1 rept., 1 museum. Employees—28 kprs., 6 watch, 89 mtce. Figures given do not include New York Aquarium at Battery Park, which is under direction of N. Y. Zoological Soc. Dr. W. Reid Blair, Director and General Curator; H. R. Mitchell, Manager; R. L. Ditmars, Curator of Mammals and Reptiles; Lee S. Crandall, Curator of Birds; William Beebe, Honorary Curator of Birds; Chas. J. Renner, Engineer and Constructor; Chas. V. Noback, Veterinarian; Claude W. Leister, Curator of Educational Activities; Edwin R. Sanborn, Editor and Photographer.

New York, N. Y.—*Central Park Zoo*. Established in 1866. Not reported. No statistics obtained.

Oklahoma City, Okla. (185,383)—*Lincoln Park Zoo*. Park Dept. Tax funds for Parks. Budg., \$12,000.00. About 25 acres in Lincoln Pk. Ex-

hibits—200 mam., 17 sp.; 224 bd., 5 sp.; 35 rept., 4 sp.; total, 459. Perm. bldg., 1 combination. Employees—5 kprs., 1 watch. Ernest B. Smith, Park Superintendent.

Philadelphia, Pa. (1,064,430)—*Philadelphia Zoological Garden*. Zoological Society of Philadelphia. Funds from members' fees, gate receipts and appropriations from city. Budg. not reported. 40 acres. Exhibits—615 mam., 1,165 bd., 1,268 rept., 63 amph., 4 fishes; total 3,115. Perm. bldgs.—6 mam., 3 bd., 1 rept., 1 museum laboratory. Employees—21 kprs., 1 watch, 24 mtce.; 7 spec. officers. C. Emerson Brown, Director.

Pittsburgh, Pa. (669,742)—*Highland Park Zoological Gardens*. City council. Tax funds. Budg., \$65,403.00. 10 acres in Highland Pk. Exhibits—180 mam., 170 sp.; 434 bd., 389 sp.; 192 rept. & amph., 154 sp.; total 806. Perm. bldgs.—2 combination. Employees—8 kprs., 1 watch, 1 engineer, 7 laborers. In 1930 new brick bldg. (60 x 80) added to main bldg. for buffalo and deer pens. James Moore, Superintendent, Bureau of Parks.

Portland, Oregon (301,890)—*Portland Zoo*. No report obtainable. C. P. Keyser, Superintendent of Parks.

Providence, R. I. (253,000)—*Roger Williams Park Zoo*. Bd. of Park Com. Tax funds for parks. Budg., \$10,000.00. Acreage not given but included in 500 acres Roger Williams Pk. Exhibits—200 mam., 10 sp.; 200 bd., 40 sp.; total 400. Perm. bldgs.—1 mam., 1 bd., 1 museum, 1 aquarium. Employees—6 kprs., 1 watch. Ernest K. Thomas, Superintendent of Parks.

Racine, Wis. (68,000)—*Racine Zoological Garden*. Park Board. Tax funds for pks. Budg., \$7,000.00. Aided by Zool. Soc. Acreage included in 279 acre park. Exhibits—131 mam., 32 sp.; 138 bd., 23 sp.; total 269. No perm. bldgs. Employees—2 kprs., 3 watch. 8 hr. shifts. I. B. Farmer, Superintendent of Parks.

San Antonio, Texas (254,562)—*Brackenridge Zoological Park*. Zoological Board of San Antonio. Tax funds for parks, concessions and Zool. Soc. Budg., \$7,000.00 (includes replacements but no new exhibits which are purchased by Zool. Soc.). 680 acres in Park. Exhibits—220 mam., 46 sp.; 685 bd., 157 sp.; 8 rept., 1 sp. (Gal. Tortoise, other rept. kept at museum not connected with zoo); total 913. No perm. bldgs., (all outside barless enclosures, flights, etc.). Employees—14 kprs., 2 watch, 4 mtce. A 2c tax on the \$100.00 administered by Zoological Bd. replaces park budg. and will net zoo \$40,000.00. F. A. Sullivan, Director.

Salt Lake City, Utah (140,184)—*Salt Lake City Zoological Garden*. Zoological Park Board. Approp. City Commission. Aid from Zool. Soc. New zoo under way at Hogle Park of 32 acres. Transfer of old zoo exhibits at Liberty Park to new location. A. E. Alexander, Secretary.

San Diego, Calif. (147,897)—*Zoological Garden of San Diego*. Board of Directors Zool. Soc. of San Diego. Taxes from city and county one-third, memberships and gate receipts two-

thirds. Budg., \$92,316.00. 160 acres. Exhibits (Jan. 1, 1931)—493 mam., 132 sp.; 1,329 bd., 268 sp.; 408 rept. & amph., 107 sp.; total 2,230. Employees—10 kprs., 9 mtce., 2 educators, 1 veterinary, 1 pathologist, 1 warehouse, 4 clerical, 4 to 6 on construction. Bldgs. include 1 research hospital, 1 rept. house, 1 office and concession bldg., 10 large and small service bldgs. There are 5 large barless grottos. Exhibits mostly out-of-doors. Belle J. Benchley, Executive Secretary. Dr. Harry M. Wegeforth, President of Society.

San Francisco, Calif. (637,212)—*Fleishacker Zoo*. Bd. of Park Com. Tax funds for pks. Budg., \$70,000.00. 60 acres. Exhibits—200 mam., 150 bd., 20 rept. & amph.; total, 370. Zoo in process of enlargement. Employees—13 kprs., 2 watch., 4 mtce. George Bistany, Director.

San Simeon, Calif.—*W. R. Hearst Zoological Gardens*. Private. 1,500 acres. Exhibits—318 mam., 68 sp.; 27 bd., 10 sp.; total, 345. Employees—5 regular kprs.; others vary according to season and construction. C. N. Baldwin, Director.

Seattle, Wash. (365,518)—*Woodland Park Zoological Garden*. Bd. of Park Com. City tax levy. Budg., \$40,580.00. 20 acres. Exhibits—338 mam., 86 sp.; 730 bd., 126 sp.; 35 rept. & amph., 19 sp.; total 1,103. Also 61 specimens of fishes. Perm. bldgs.—5 mam. Employees—9 kprs., 4 mtce. Dr. Gus Knudson, Director.

South Bend, Ind. (103,666)—*Pottswattomie Park Zoo*. Bd. of Park Com. Tax funds for pks. Budg., \$2,000.00. 4 acres. Exhibits—17 mam., 6 sp.; 16 bd., 5 sp.; total 33. Employees—1 kpr., 1 mtce. Operated as part of park attractions. William H. Walker, Superintendent of Parks.

Springfield, Mass. (149,861)—*Forest Park Zoological Garden*. Park Commission. Tax funds for pks. Budg., \$15,564.00. 25 acres. Exhibits—119 mam., 9 sp.; 195 bd., 9 sp.; total, 314. Perm. bldgs.—4 mam., 4 bd. Employees—5 kprs., 1 watch., park laborers. Harold E. Simpson, Head Zoo Keeper.

St. Louis, Mo. (822,932)—*St. Louis Zoological Park*. Zoological Bd. of Control. Supported by mill tax voted by citizens of 2c on the \$100.00 of all taxable property. Annual mtce. budg. (1930), \$168,660.19. 77 acres in Forest Park. Exhibits (Jan. 1, 1931)—382 mam., 139 sp.; 860 bd., 179 sp.; 581 rept., 116 sp.; 86 amph. & fishes; total 1,909. Perm. bldgs.—7 mam., 2 bd., 1 rept. Employees—24 kprs., 5 watch., 30 mtce. In 1930 total income from taxes amounted to \$270,160.86, the difference between this amount and maintenance, used for perm. bldg. construction. George P. Vierheller, Director; John E. Wallace, Architect and Superintendent of Construction; Dr. R. A. Kammerer, Veterinarian; R. Marlin Perkins, Curator of Reptiles; Henry M. Kennon, Ornithologist.

St. Paul, Minn. (271,418)—*Como Park Zoo*. Commissioner of Parks. Tax funds for pks. Budg., \$7,000.00. Planned for 80 acres in Como Park. Exhibits mostly native Minnesota animals

—100 mam., 21 sp.; 28 bd., 8 sp.; 7 rept., 1 sp.; total 135. One comb bldg. 2 kprs. Park Superintendent.

Syracuse, N. Y. (207,007)—*Municipal Zoo*. Park Dept. with aid from Zoo Commission. Tax funds for pks. Budg., \$10,000.00. 4 acres. Exhibits—70 mam., 35 sp.; 130 bd., 17 sp.; total 200. One comb. bldg. Employees—3 kprs., 1 watch. W. A. Barry, Park Commissioner.

Tacoma, Wash. (106,885)—*Point Defiance Zoo*. Metropolitan Park Comm's. Tax funds for parks. Budg., \$3,600.00. Small area in Pt. Defiance Pk. of 670 acres. Exhibits—30 mam., 6 sp.; 200 bd., 20 sp.; total 230. Employees—1 kpr. Waldo F. Prescott, Superintendent of Parks.

Toledo, Ohio (290,803)—*Toledo Zoological Park*. Zoological Bd. of Managers. City approp. tax funds; aid from Zool. Soc. Budg., \$41,000.00. 33 acres. Exhibits (Jan. 1, 1931)—281 mam., 73 sp.; 353 bd., 68 sp.; 473 rept. & amph., 70 sp.; total 1,865; also exhibits 356 fish, 12 sp., and 402 invertebrates, of 7 sp. Perm. bldgs., 6 mam. Birds are exhibited in mam. house; rept. in elephant house; fishes in primate house and museum exhibits in lion house. Employees—9 kprs., 2 watch., 2 mtce. Percy C. Jones, President; Dr. Reuben Hilty, Veterinarian; Frank L. Skeldon, Secretary; Roger Conant, Curator of Reptiles and Educational Director.

Toronto, Ont., Canada (606,370)—*Riverdale Park Zoo* (main collection) *High Park Zoo* (ruminants and waterfowl). Parks Dept. (Commissioner of Pks.). Tax funds for parks. Budg., \$49,445.00. 30 acres. Exhibits—177 mam., 88 sp.; 590 bd., 114 sp.; 55 rept., 10 sp.; total 822. (Waterfowl collection at Island Pk. included). Employees—8 kprs., 2 watch. J. A. Campbell, V. S., B. V. Sc., Curator Toronto Parks Dept. Zoological Section.

Tulsa, Okla. (141,281)—*Tulsa Zoological Garden*. Bd. of Park Com. Tax funds for parks. Moral support Zool. Soc. Budg., \$12,000.00. 250 acres in Mohawk Pk. Exhibits—198 mam., 47 sp.; 685 bd., 141 sp.; 289 rept. & amph., 43 sp.; total 1,172. Perm. bldg., 1 bd. Employees—6 kprs., 1 mtce. All exhibits outside except birds, with native rock enclosures and large ranges. Expenditures for perm. imp. in 1930, \$18,867.57; 1931, \$8,500.00, from park bond funds. Will O. Doolittle, Director; Hugh S. Davis, Assistant Director; C. H. Allen, Curator of Mammals; Milton Hill, Aviculturist; M. E. Erwin, Curator of Reptiles.

Virginia, Minn. (11,784)—*Virginia Zoo*. Park Commission. Tax funds for pks. Budg., \$4,000.00. Less than 10 acres in Olcott Pk. Exhibits—32 mam., 5 sp.; total 32. 1 small perm. bldg. Employees—1 kpr. A. F. Thayer, Superintendent of Parks.

Washington, D. C. (486,869)—*National Zoological Park*. Smithsonian Institute. U. S. Government appropriations. Budg., \$220,000.00. 176 acres in Rock Creek Park. Exhibits (Jan. 1, 1931)—678 mam., 190 sp.; 1,046 bd., 327 sp.; 600 rept. & amph., 150 sp.; total 2,971. Perm. bldgs., 3 mam., 1 bd., 1 rept. Employees—yearly

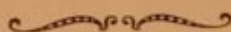
average of 96 for all purposes. Dr. W. M. Mann, Director.

Wichita, Kans. (111,039)—*Central Riverside Zoo*. Bd. of Park Com. Tax funds for pks. Budg., approx. \$5,500.00. 4 acres. Exhibits—44 mam., 11 sp.; 66 bd., 27 sp.; 3 rept., 1 sp.; total 113. Perm. bldgs.—2 small mam., 1 bd. Employees—3 regular, other pk. labor. Alfred MacDonald, Director Parks and Forestry.

Williamsport, Pa. (45,695)—*Williamsport Zoo*.

City Council. Tax funds. Budg., \$3,000.00. 2 acres. Exhibits—40 mam., 20 sp.; 45 bd., 6 sp.; total, 85. 1 mam. bldg. Employees—1 kpr., other park labor. Geo. R. Fleming, Superintendent of Parks.

Winnipeg, Man., Can. (200,286)—*Assiniboine Park Zoo*. Public Parks Bd. Tax funds for pks. Budg., \$7,660.00. Exhibits native only—91 mam., 15 sp.; 554 bd., 13 sp.; 5 rept., 1 sp.; total 650. Employees—2 kprs., 1 watch. G. Champion, Superintendent, Public Parks Board.



THE AMERICAN ASSOCIATION OF ZOOLOGICAL PARKS AND AQUARIUMS

The American Association of Zoological Parks and Aquariums was organized October 9, 1924, at Washington, D. C.

The purposes of the Association are "to promote and advance zoological parks and aquariums; to aid in the exchange and importation of zoological specimens; to provide exhibits for scientific, educational and recreational purposes; and to aid in the preservation of wild life."

Membership consists of those who are actively interested in the purposes of the Association, provided that they are members of the American Institute of Park Executives or the American Park Society and have been approved by the membership committee of the Zoological Association.

OFFICERS

Officers and Directors of the Association for 1932 are:

George P. Vierheller, St. Louis, Mo., Chairman.

Dr. W. M. Mann, Washington, D. C., Vice Chairman.

Roger Conant, Toledo, Ohio, Secretary.

Edward H. Bean, Chicago, Ill., Treasurer.

John T. Millen, Detroit, Mich., and Edmund Heller, Milwaukee, Wis., Directors.

STANDING COMMITTEES

There are a number of standing committees of the organization. The chairmen for 1932 are as follows:

Membership—Alfred D. Luehrmann, St. Louis, Mo.

Exchanges and Purchases—Edward H. Bean, Chicago, Ill.

Statistics and Publications—Will O. Doolittle, Tulsa, Okla.

Legislation—Dr. Harry M. Wegeforth, San Diego, Calif.

Importations, Exportations and Quarantine—Dr. Reuben Hilty, Toledo, Ohio.

Aviaries—Lee S. Crandall, New York, N. Y.

Express and Transportation—C. Emerson Brown, Philadelphia, Pa.

Design and Construction—John E. Wallace, St. Louis, Mo.

Aquariums—Alvin Seale, San Francisco, Calif.

OFFICIAL ORGAN

PARKS & RECREATION, published by the American Institute of Park Executives, is the official organ of the Association. This is a high class monthly magazine, devoted to all phases of park and recreational work and including a well illustrated section on

Zoological Parks. The subscription price to non-members is \$3.00 a year, the circulation office being at the National Building, Minneapolis, Minn. C. Emerson Brown of Philadelphia and Dr. W. M. Mann of Washington are editors of the Zoological Parks section, with R. Marlin Perkins of St. Louis, Roger Conant of Toledo, and Hugh S. Davis of Tulsa as special contributors. All of the above have collaborated with Chairman Vierheller and the editor

in the production of this first annual book. In addition to the Zoological Parks section, the magazine carries monthly a Department of Conservation of Wild Life, conducted by Paul B. Riis, director of the Allegheny County Parks, Pittsburgh.

The Association meets annually at the same time and place as the American Institute of Park Executives. The 1932 meeting will be held at Washington, D. C.

EDITORIAL REVIEW

By WILL O. DOOLITTLE

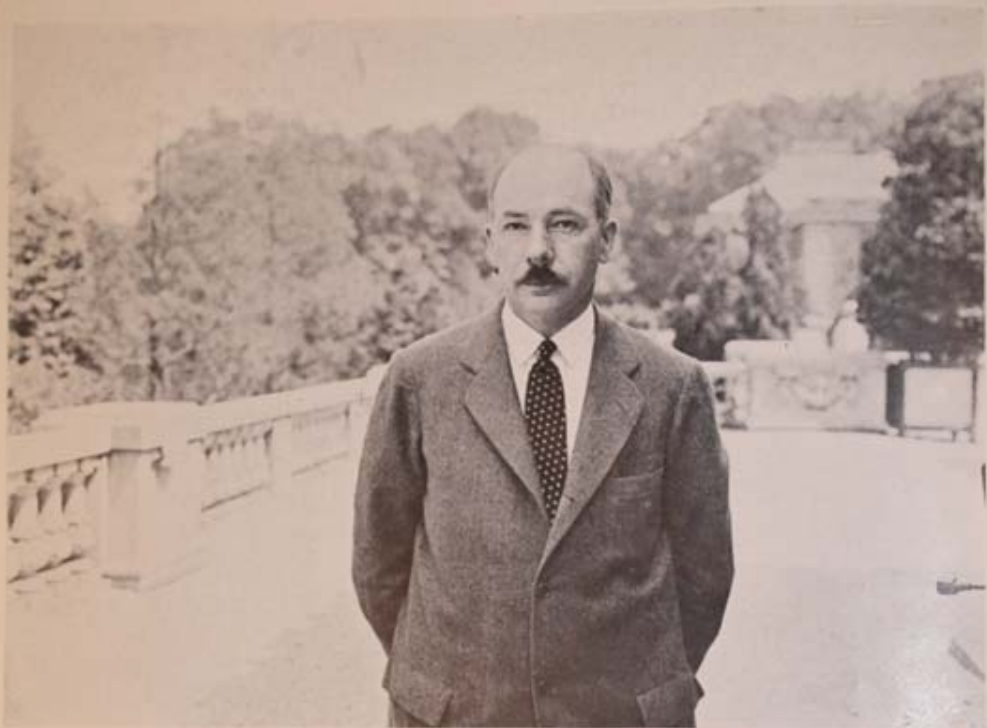
In this book the American Association of Zoological Parks and Aquariums has endeavored to present only such matter as might be helpful to cities contemplating the establishment of zoological parks or aquariums or actually engaged in the operation of same. The book was not intended as a complete presentation of the subject nor do we claim that it is in all instances authoritative. To publish such a book would have been beyond the present financial ability of the Association and would have involved much more time and labor than we have been able to give to the present volume.

Our efforts have centered in producing a book that would be instrumental in arousing interest in zoological exhibits and in helping to build these in the right way, and to have them properly cared for when established. In spite of the handicaps under which we have labored we believe that we have been successful within the limitations set by the sponsors of the book. It is hoped that future editions may present such phases of the work as have been omitted or curtailed in this first annual publication, especially in regard to proper care (such as feeding and housing the exhibits) and the educational work that can be carried on by properly managed gardens.

As stated in our introduction, a great

many of the articles in this book were previously published in *PARKS & RECREATION* and therefore are not new to the readers of that magazine. For this we offer no apology as we believe that this book will bring about a wider reading of the excellent articles written by the experts who have contributed of their thought and knowledge without remuneration other than a love for their work and the desire to be helpful to others. Furthermore, had the Association not availed itself of these articles, already in type, it would not have been able to bear the cost of publishing a book even as limited in its scope as this one.

Since an annual book was conceived by the Association two years ago, the entire country has suffered severely from a decided slump in business conditions. Municipalities everywhere are bearing a heavy burden—in many cases a most oppressive one. The present is not what might be termed opportune for the promotion and establishment of zoos. Nevertheless, it is not expected that public improvements and desirable recreational, scientific and educational facilities will for long experience the tremendous difficulties that now beset them. The near future may see a new interest and a stimulation of activity and when it does come the experiences that have been undergone during



LEE S. CRANDALL

Mr. Crandall is Curator of Birds at the New York Zoological Park. The director and curators of this great park are foremost in their work and the names of W. Reid Blair, Wm. Beebe, Raymond L. Ditmars and Mr. Crandall are familiar throughout the world.

the past two years will be productive of more economical measures, better administration, and a thorough understanding of all projects. We trust that this book may play its part in the resumption of a well planned and efficient program.

Not all cities will be able to build complete or comprehensive zoological parks but many can maintain to good advantage certain features of these parks. It may be only a wildfowl lake, a reptile collection, a pheasantry, a deer range, a house for foreign birds, a native bird sanctuary, or possibly just more effort placed on protective measures for such wild life as the parks contain. In any event, the attraction will be well worth the investment and conducive to the pleasure and benefit of the people.

Possibly not enough emphasis has been placed in the present volume on the great value of bird collections and exhibits of

reptiles that can be made at comparatively low costs. These are most desirable and fortunately we have in our membership men of much learning and competence who are willing to help others in their undertakings. The bird and literary work of William Beebe and Lee S. Crandall and the reptile teachings of Raymond L. Ditmars have supplemented the value of the New York Zoological Park in a most practical way. The new bird houses in St. Louis, Milwaukee and Washington are carrying a splendid daily lesson to our people. Within the last few years Washington and St. Louis have built wonderful new reptile houses that have been instrumental in creating a fine new interest in a form of our wild life heretofore only casually and often indifferently or even antagonistically considered. Detroit has built and Chicago is building complete gardens of new and wonderful design. The

directors of zoological parks and officers of our Association are constantly being called on for advice and service to other cities, which is an evidence of the general interest in zoological parks. The influence of these men and these exhibits is being carried to all parts of the country, as well as abroad, and is being reflected in the establishment of smaller but not less worthy zoos in many

cities not so favorably endowed with financial support.

In a large measure this book may be accepted as a message of encouragement and help from those who have blazed the trails to all who are interested in the building of worth-while zoological parks and who appreciate their distinct value in making life happier and better.

