

selecting observers admirably qualified for this investigation; nor need we fear that the United States Government will be wanting in their accustomed liberality in publishing the Reports on the subject when they are prepared. Nor will the unofficial geologists of the country and private associations be behindhand in contributing to the mass of information gradually accumulating upon the question of the nature and origin of the terrible event.

#### ON LION-BREEDING<sup>1</sup>

THE Gardens of the Royal Zoological Society of Ireland have become famous among zoological gardens for their breed of lions. While here and there among the zoological gardens of the world a lion cub is born, none save those of Dublin can boast of a period of lion-cub production of nearly thirty years' duration, or of the extraordinary success of the birth of 131 cubs. This being so, we are indebted to Mr. V. Ball for a history of the subject, which has been published in a recent part of the *Transactions* of the Royal Irish Academy. The subject is one of interest in several ways, and the following short abstract of the details will call our readers' attention to it.

In 1855 a pair of lions from Natal were purchased for these Gardens. The exact relationship of these appears to have been unknown, but their first litter was born in 1857. From 1857 to 1885 we find a total of 131 cubs born, of which twenty-one were either born dead or died shortly after birth, and 110 were reared, eighty-six of these latter being sold, greatly to the profit of the Society and to the advantage of very many of the zoological gardens of Europe, Asia, and America. These 131 cubs were the offspring of nine lionesses and four lions; of the latter, one, "Natal," was the father of forty-two cubs; and another, "Old Charley," who was a son of "Natal's," was the father of forty-six; while of the former, one, "Old Girl," who was born in the Gardens in 1859 as one of a litter of five, was the mother of no less than fifty-five cubs, of which forty-nine were reared. This prolific lioness died at the age of 16 years, apparently of old age.

The facts given by Mr. Ball in one of his very carefully compiled tables seem to indicate two periods of the year at which lionesses in a state of semi-domestication produce their young. While the absence of any well-authenticated information as to the period of the year in which lion cubs are born when in a state of nature is quite remarkable, yet Mr. Ball ventures the fairly safe surmise that considering the period necessary for the rearing and education of a cub to be at the least a year, for the cub is often learning to kill its prey when over a year old, it is most improbable that lionesses have more than one litter in a year when in a wild state; but he thinks it probable that the geographical surroundings of the parents may alter this period, and that it may be in the autumn season in the tropics, when the great heats and droughts of summer are over, and in the spring season in more temperate climes, where the summer warmth would be of service to the young offspring; and he very ingeniously speculates that the two periods of maximum production, as observed in the lionesses in the Dublin Gardens, may have been inherited from two corresponding periods, the result of climatal conditions in a wild state. Another remarkable phenomenon comes to light on comparing the curves of production, when modified into curves of conception, with the monthly curves of temperature for Dublin. In doing so, the maximum curve in the one case is found to closely approximate to the maximum curve of temperature, *i.e.*

June and July; and the second maximum curve corresponds to the period of lowest temperature, *i.e.* December and January: but it will be remembered that then the animals are kept in well-heated houses, so that this period, as to temperature, may, though the temperature be artificial, be compared to the other, when it is natural.

The cubs when born are noted as distinctly spotted with dark brown on a ground colour which is rather light brown than fulvous; from about one to three months they are perhaps most distinctly defined; and, though along the back the spots are somewhat quadrangular in shape, there is no indication of actual bars or bands.

In reference to the sexes of the cubs, Mr. Ball is able from accurate information to record the sex of 130 of the cubs, and we find 74 were males and 56 females, giving a majority of 14 males in every 100 cubs. This is an interesting and novel addition to our knowledge of the natural history of the large Carnivores.

No lion or lioness lived in the Gardens for a longer period than 16 years, and it seems probable that 12 to 14 years is the average duration of lion life. The cases so often referred to of lions living to an age of 20 to 30, or the case of "Pompey," who died in the Tower in 1760 at the age of 70, stand on no scientific or even reliable evidence.

Under the heading of "The Cause of Success in Breeding," we find some valuable suggestions as to the keeping of these splendid Carnivores; but we searched in vain for the secret of success. Horse-flesh is evidently not dear in Dublin, as the annual cost of the food of an adult lion, being for the most part horse-flesh, only came to 15% in 1885. A series of tables accompanies the memoir, and some illustrations of the cubs of the lioness "Queen," born April 1885, from drawings by Mr. Thomas.

#### NOTES

AN article in NATURE for May 6 (p. 7) drew attention to the fact that this present year is the tercentenary of the introduction of the potato into England, and discussed some of the points of its history. Apart from the purely historic aspects of the question, "Whence did our potato first come?" it was shown that in connection with the suggestion of cross-breeding to strengthen against disease it is very important to know which is the species that for three hundred years we have been cultivating. With a view to drawing the attention of cultivators to the subject, it is proposed to hold a Tercentenary Potato Exhibition at the St. Stephen's Hall, Westminster, from Wednesday, December 1, to Saturday, December 4, and to appoint one of those days for a Conference, when some of the unsettled questions may be discussed. The Exhibition will consist of four sections:— (1) An historic and scientific collection, to include early works on botany, in which the potato is figured; maps showing the European knowledge of the New World three hundred year ago, and the proximity of potato-growing districts to the ports most frequented; early books on travel and voyages in which references to the potato occur; works and papers in which attempts to define the different species are made; illustrations of the species and varieties; contemporary references to the voyages of Hawkins, Drake, Grenville, and Raleigh. (2) Illustrations of potato disease, and works on the subject. (Sections 1 and 2 will be arranged under the advice of a committee of scientific gentlemen who have consented to give their co-operation.) (3) Methods for storing, preserving, and using partly diseased potatoes, &c. (4) A display of tubers of all the various varieties grown. (In this section gold, silver, and bronze medals will be awarded. Each exhibit must be accompanied by a statement of date of planting, locality, nature of soil, &c.)

<sup>1</sup> "Observations on Lion-Breeding in the Gardens of the Royal Zoological Society of Ireland," by V. Ball, M.A., F.R.S., Director of the Science and Art Museum, Dublin, and Hon. Sec. of the Royal Zoological Society of Ireland. *Transactions* of the Royal Irish Academy, vol. xxviii. Part 24, August 1886.