

The Modern 'Zoo.'

ALMOST simultaneously there have been made announcements of two proposals of great importance in the evolution of the modern zoological garden in Britain. The Zoological Society of London has acquired an estate of 400 acres, lying under the Dunstable Downs, midway between Tring and Luton, which is to be developed on lines very different from those familiar in Regent's Park; and the Zoological Society of Scotland proposes to develop its park to the crest of Corstorphine Hill, over 47 acres which it now possesses but which have hitherto been used as a golf course.

of Nature, wished to see at close quarters, but in conspicuous safety, the fiercest and the rarest of animals, and the old zoos met the demand by erecting closely packed cages and stout iron bars. The public no longer sets so high store upon the cramped animal, spending a lifetime in an endless promenade of an inadequate cage, and a growing responsibility towards the animals themselves, as well as a developing artistic perception, have led to the modern ideal of surroundings approaching as closely as possible to the natural environment, in which animals may display their graces of move-



Photo]

FIG. 1.--The Polar Bear enclosure in the Scottish Zoological Park.

[J. O. McKechnie

In magnitude the two ventures are scarcely comparable, but both are at one in indicating that the future of zoological garden development in Great Britain lies along the lines of spaciousness and freedom, and that the old-fashioned 'zoo,' cramped in space and overstocked in kind, meeting neither the needs of the animals nor the demands of the Nature lover, is on the path to extinction.

The change marks a revolution in the attitude of the public towards captive animals during the past century. The 'zoo' fashion swept over Europe in the early half of the nineteenth century: the London Zoo in Regent's Park was founded in 1828; the Dublin garden in 1830; Clifton, Bristol, in 1835; Belle Vue, Manchester, in 1836; Amsterdam in 1838; Antwerp in 1843; and Berlin in the year following. The people, animated by a sensation-loving curiosity rather than by a love

ment and repose in the greatest permissible freedom. It is interesting to recall that the prime movers in this beneficent revolution were not the great public zoos, but the owners of private collections.

The Zoological Society of London has been fortunate in its choice of new ground. The natural slope of the Ashridge estate, rising on one side rather abruptly from the 500 ft. contour to more than 700 ft. above sea-level (and half the entire area exceeds the latter altitude), gives scope for wide outlooks and fine panoramic effects, which will add repose and nobility to their tenants. So far as possible, the natural amenities of the site will be retained, and, in place of unsightly barriers, concealed ditches and sunk fences masked by natural scenery will separate the different groups of animals. A chalk foundation affords a medium readily excavated, so that the creation of attractive

caves and shelters and dividing trenches becomes largely a matter of artistic planning and moderate expenditure.

In this handsome park the Society proposes to instal the larger and more hardy of its animals, its breeding and recuperating animals, and the majority of its duplicates. But apart from foreign imported creatures, Ashridge should become a great British sanctuary, tenanted by native birds, and exhibiting, congregated as they cannot be seen in any other part of the country, the few mammals which still exist, and those which formerly existed, in Britain. The stock in the London Zoo will benefit by reduction, and Regent's Park will become the home of a typical synopsis of the animal kingdom, and of the more delicate creatures which demand special conditions of temperature, feeding, and the like.

The proposed extension of the Scottish Zoological Park is less of an adventure in more ways than one, for since its inception in 1912 the Park has all along been developed on modern lines, and the inclusion of the remainder of its 74 acres, nearly twice the extent of the Regent's Park Zoo, is but the fulfilment of a project which the Council has had in view from the beginning. Nevertheless, it is an impressive scheme. The addition will carry the Park to the ridge of Corstorphine Hill at an altitude of 500 ft. above sea-level, and, while still retaining the southern exposure which has meant so much for the welfare of the animals, will throw open a fine northern prospect across the Firth of Forth and its islands to the hills of Fife and the Highlands of Perthshire. The ground is less

amenable to artificial treatment than the chalky subsoil of Ashridge, for the rock is hard and costly to excavate; but the gain is greater than the loss, since Nature has already carved the summit into rocky ridges and hillocks, affording sites which will exhibit at their best such mountain creatures as wild sheep, goats, chamois, and the like. On the lower ridges it is proposed to excavate dens and shelters for carnivores, and to give over a portion to native British mammals, while the pasture land will become ranges for native and foreign deer, bison, etc.

The sole obstacle to the development of this ground is a financial one. Last year the takings showed a modest surplus of £2000, and since the opening of the Park, all its surplus income, amounting to more than £10,000, has been spent in improvements which have added to the comfort of the animals and the attractiveness of the exhibits. To lay out and utilise the new ground, and to provide further improvements in some of the existing enclosures for animals, it is estimated that £25,000 will be required. Since such a sum cannot be obtained from the present income of the Park, the Council has issued an appeal for that amount, so that the Park may become a "National Institution, unrivalled for beauty of site and natural amenity." In furtherance of the scheme, it is announced that a mid-summer carnival and fête will be held in the Park in June. The conspicuous success already attained in the development of a modern zoological park in Edinburgh indicates that the new effort of the Zoological Society of Scotland is worthy of all support.

The Theory of Strong Electrolytes.

THE general discussion on "The Theory of Strong Electrolytes," organised by the Faraday Society at Oxford on April 22 and 23, was rendered noteworthy by the foreign guests who were able to attend and to take part in the proceedings: Bjerrum, Brønsted, and Christianssen from Copenhagen, Fajans from Munich, Hevesy from Freiburg, Hückel (a former colleague of Debye) from Göttingen, Onsager (a present colleague of Debye) from Zurich, Remy from Hamburg, and Ulich (a colleague of Walden) from Rostock, represented the European universities, whilst America was represented by Harned from the University of Pennsylvania and Scatchard from the Massachusetts Institute of Technology. The delegates enjoyed the hospitality of Exeter, Jesus, and Lincoln Colleges, and the informal discussions carried on there were not the least valuable features of the meeting.

It is now forty years since Arrhenius effected a far-reaching change in the theory of aqueous solutions by introducing the conception of electrolytic dissociation, and there can be little doubt that similar importance attaches to the recent development, by Milner, and more recently by Debye and Hückel, of theories based upon the conception of 'complete ionisation' of electrolytes. This conception, although devised in the

first instance to explain the behaviour of electrolytes in solution, has received important support from the study of crystalline salts, which has shown that most of them can be pictured as aggregates of oppositely charged ions, in which individual molecules cannot be detected, as well as from the electronic theory of valency, which has provided an explanation of the inability of these ions to effect the transfer of electrons which would convert them into neutral molecules.

The chief weakness of Arrhenius's theory lay in the fact that, although the dissociation of weak electrolytes on dilution with water was in accord with the law of mass action, this law broke down completely in the case of strong electrolytes, *i.e.* of all the common salts, as well as the stronger acids and bases. Many formulæ have been devised in the hope of discovering a law of dilution which should be applied to these perfectly normal, but obstinately intractable, electrolytes; but modern theory has turned back to an old expression of Kohlrausch, $\Lambda_c = \Lambda_\infty - a\sqrt{c}$, according to which the equivalent conductivity Λ_c , at concentration c , is less than that at concentration 0, by an amount $a\sqrt{c}$ which is proportional to the square root of the concentration. This law, which can be tested