presented by Major Wardlaw Ramsay, to whom it had been bequeathed by his uncle, the Marquis of Tweeddale. Messrs. Salvin and Godman not only gave their unrivalled set of American birds, but Mr. Godman supplemented this splendid present by employing a staff of collectors to work out the ornithology of Mexico, and presented the results of their expeditions to the Museum. He also purchased the celebrated Henshaw collection, and gave it to the nation. Many other collections have since been acquired by him, and likewise presented to the Trustees of the British Museum. Only lately can it be said that we possessed in England a representative set of North American birds.

Meanwhile, although the series of Indian, African, Australian, and American birds had become adequate and representative, the ornithology of the Palæarctic region was but feebly illustrated. Through the exertions of Lord Walsingham and other English ornithologists, the nesting-habits of our British birds have been successfully demonstrated by the well-known series of groups in the Natural History Museum; but the birds of Europe and Northern Asia were poorly represented in its cabinets. By the splendid bequest of Mr. Henry Seebohm, this vacuum in our Palæarctic collections has been filled, though there is no one in the Museum who does not feel that this addition to the strength of its ornithological section has been attained only through the loss of one of the truest friends of the institution which his dying wishes have enriched. There has not yet been time to register and incorporate the specimens of the Seebohm collection, but we know that we have now received the principal collection of Palæarctic birds of modern times.

A few years ago Mr. Seebohm presented his collection of eggs, and, with this as a basis for the work, the entire series of oological specimens in the Museum was set in order and arranged under his own supervision by my daughter, Emily Mary Sharpe, till it was found that, with the Hume and Salvin-Godman collections, the British Museum could boast of a series of 48,000 eggs of birds.

In the same generous spirit, he freely gave the type-specimens of any birds he possessed, that the value of the "Catalogue of Birds" might be enhanced thereby; and now, by leaving the contents of his Museum to the nation, the British Museum becomes possessed of several invaluable additions to its ornithological collection. Thus are added: the Swinhoe collection of Chinese birds, the Pryer collection of Japanese birds, the series of specimens obtained by Holst in the Bonin and Loo-choo Islands, and Formosa; and last, but not least, his own European and Siberian collections, the result of his travels in all parts of Europe, and of his expeditions to the valleys of the Petchora and the Yenesei. Of his collection of *Charadriidæ*, he had already presented hundreds of specimens to the Museum, but by his bequest is added the series which formed his special series of the plovers and snipes, on which, indeed, was founded his great work on the geographical distribution of the *Charadriidæ*. He had, moreover, in contemplation a "Monograph of the Turdidæ, or Family of Thrushes," and in pursuance of this object he had amassed a large collection of thrushes, which now passes into the ornithological collection of the British Museum. Nests and skeletons of birds are in plenty, and a set of the Layard collection of Oceanic birds and others from the Whitehead expedition to Kina Balu, the Prjevalski and Severtzov expeditions in Central Asia, make up one of the most important donations which the Trustees of the British Museum have ever received. His series of skins of the *Phasianidæ* was one of the finest in the world, and the value of the osteological collection cannot be overestimated, as it formed the material on which was founded his many essays on the "Classification of Birds."

In this necessarily imperfect sketch of the contents of the Seebohm collection, of which a fuller account will only be possible when it has been arranged and registered in the archives of the British Museum, it is impossible to give a detailed history of the various collections which constitute its importance to ornithologists. I feel, however, that I cannot close this article without expressing my opinion of the great loss which ornithology in general, and this country in particular, have sustained by the death of Mr. Seebohm, for, had I space to tell, it would interest naturalists to know how the great collection of birds in the Natural History Museum has been built up, by the help of such men as Henry Seebohm and the other munificent, though unostentatious, donors whose names I have recorded above. I believe, however, that under the enlightened sway of its present Director, the Museum has a still greater future before it than it has enjoyed in the past, and that when the common people have the opportunity to "read, mark, learn, and inwardly digest" the lesson which the Museum is trying to teach, the nation at large will still more fully appreciate the work of such men as Henry Seebohm.

R. BOWDLER SHARPE.

MOVEMENT.[1]

SOME of the results of the researches of M. Marey on the movements of men, horses, and fishes, have appeared from time to time in English papers. The skill and originality displayed by M. Marey in experimental work, involving great difficulties, must have astonished many, at a time when the idea of taking a rapid succession of photographs of a moving object was new.

The method of determining time-periods by means of a continuous chain of photographs appears to be due to Mr. Jansen, who used it in 1874 to record the transit of Venus across the sun's disc; he also suggested that the method might be applied to the study of animal locomotion. The subject of intermittent photography was attacked by Mr. Muybridge, who discovered, by means of a method different from that suggested by Jansen, the analysis of the locomotion of men, horses, and other animals. Mr. Muybridge took successive photographs of moving animals, using a battery of cameras and lenses, each plate being exposed automatically at the required instant; he also produced photographs of pigeons in flight. The end aimed at by Marey was to use a succession of photographs for chronographic purposes: photographs so taken have been called chronophotographs; his method of procedure is as follows. The object to be chronophotographed performs its movements in full sunlight before a black background of unilluminated velvet. The camera employed is furnished with a slotted disc (*disque fenêtre*) which can be uniformly rotated; as each slot cuts the beam of light reflected from the moving object, the sensitive plate receives an impression, which gives the exact form and position of the object at the instant, the duration of exposure being $\frac{1}{500}$th of a second, and the interval between the formation of each image $\frac{1}{10}$th of a second. A chronometric dial is so placed that the position of its revolving pointer is recorded on the same sensitive plate; this instrument serves to indicate both the time of exposure and the time between successive exposures, the pointer of the chronometric dial being driven at a known uniform velocity.

Provided with this instrument, and the photographic gun (which is described on pp. 108–115), and certain other special arrangements for the chronophotography of fishes, the excellent results shown in "Movement" have been obtained.

Mr. Eric Pritchard, assisted by his sister Mrs. Chalmers

[1] "Movement." By E. J. Marey. Translated by Eric Pritchard, M.A., M.B., B.Ch. (Oxon.) 323 pp., 200 illustrations. (London: William Heinemann, 1895.)

Mitchell, has produced an excellent translation of "Le Mouvement," by E. J. Marey (G. Masson, Paris), on which they may be much congratulated. The work will be most acceptable to a large number of readers widely differing in their lines of study. In many cases the details of the construction of the apparatus and its use are so clearly given, that but little difficulty should be experienced by any of those who wish to use chronophotography in researches on the movements of any animals, from elephants to microscopic insects. The translators have reproduced a large number of plates, amongst which the following seem to be good illustrations of chronophotography.

The flight of the heron (p. 233).

The arrangement of apparatus for taking three simultaneous chronophotographs of a flying bird from three points of view—from the front, the side, and from above (p. 236). By means of these chronophotographs, bas-reliefs have been constructed, showing the successive attitudes of the bird during flight.

Different figures of rotation (Figs. 15-24); amongst which that of a certain sphere (p. 30) is most curious. "The inner and outer surfaces of this sphere can be seen at one and the same time."

Fig. 92. Successive phases of a long-jump; this should be of interest to the tyro in athletics, as by it the exact position of the champion athlete may be seen at any instant.

Successive phases of a long jump. (Chronophotography on a fixed plate.)

It is much to be regretted that several plates in the French edition have been omitted, notably that of the camera and revolving disc, which shows at a glance the disposition of the different parts of one of the most important instruments; and that of the print, at the end of the French edition, called "Escrime au Bâton," which is full of life and energy, and would certainly appeal much both to the scientific and to the artistic reader.

F. J. S.

THE NEW MUZZLING ORDER.

SINCE Darwin, in his "Journal of Researches," wrote of the occurrence of hydrophobia in Central and South America, much has been learned of the nature of this disease. He says: "In so strange a disease, some information might possibly be gained by considering the circumstances under which it originates in distant climates; for it is improbable that a dog already bitten should have been brought to these distant countries." It is now known that such a possibility must receive careful consideration. In the first place, it has now been placed beyond doubt that hydrophobia is a specific infective disease, which so far as can at present be ascertained, does not originate *de novo*, but can only be introduced into a district or country by being passed on from animal to animal, different species of which, however, are affected in very varying degree. In the second place, the disease may remain latent for a long period after an animal has been infected—through a bite, usually; for this reason it is sometimes a very difficult matter to trace the infection to its source, with the result that the method of spread of the disease was for long very imperfectly understood, although the means for preventing its extension, when once it had obtained a foothold in a district, had long been elaborated and found to be thoroughly efficient when properly applied.

In this country our statistics relating to the localisation of rabies are now so full and trustworthy, that it seems to be little short of a public health scandal that the disease has not long ere this been completely eradicated from our midst. Let us take this new muzzling order, which is undoubtedly a step in the right direction. For some time past it has been perfectly well known that an outbreak of rabies was not only imminent, but had actually occurred in the north of London. The disease has made its way apparently from Essex to Middlesex, or it may be from the north, but up to the promulgation of the muzzling order, which came into force on Monday, no definite effort had been made to circumscribe the disease. We may expect that the regulations now brought into force will very soon have the desired effect of diminishing the number of animals returned as rabid; but from the experience of the Berlin authorities, we cannot expect to stamp out the disease even in London so long as Middlesex, Surrey, and the surrounding counties of Essex, Sussex, and Hampshire return cases of rabies, and any one of them fails to enforce a muzzling order. In Berlin, up to July 1853, there was no muzzling order, and in 1852 there were 107 cases of rabies reported, and up to July 1853, 85 cases. After this there was a marked fall in the number of cases; but so long as the law was merely municipal, the disease had still to be reckoned with. Since, however, the Prussian Animals Diseases Acts, 1875 and 1880, were passed (relating to the whole of Prussia), the disease has become rare, and *only occurs along the French and Russian borders.*

It is to be noted that rabies in England and Scotland is at present confined entirely to certain populous counties and centres, and that it is especially common in those districts in which dogs are favourite domestic companions or pets. On examination of the Rabies Chart for the year 1894, it is found that the majority of cases occur in Lancashire, the West Riding of Yorkshire, then, *longo intervallo*, Cheshire, London, Ayr, Lanark, and