PHOTOGRAPHS OF A TUMBLING CAT.

M. MAREY'S recent photographs of a falling cat, taken with the view of determining the mechanical conditions which enable the animal to alight on its feet, have excited considerable interest. Figs. 1 and 2 accompanied his paper on the tumbling of cats, presented to the Paris Academy, and are reproduced in *La Nature*. The former gives a side view of pussy, and the latter a back view. The cat was held by its feet, and was let go in that position. In each of the pairs of figures, the series of images runs from right to left, and the lower is a continuation of the upper. The expression of offended dignity shown by the cat at the end of the first series indicates a want of interest in scientific investigation.

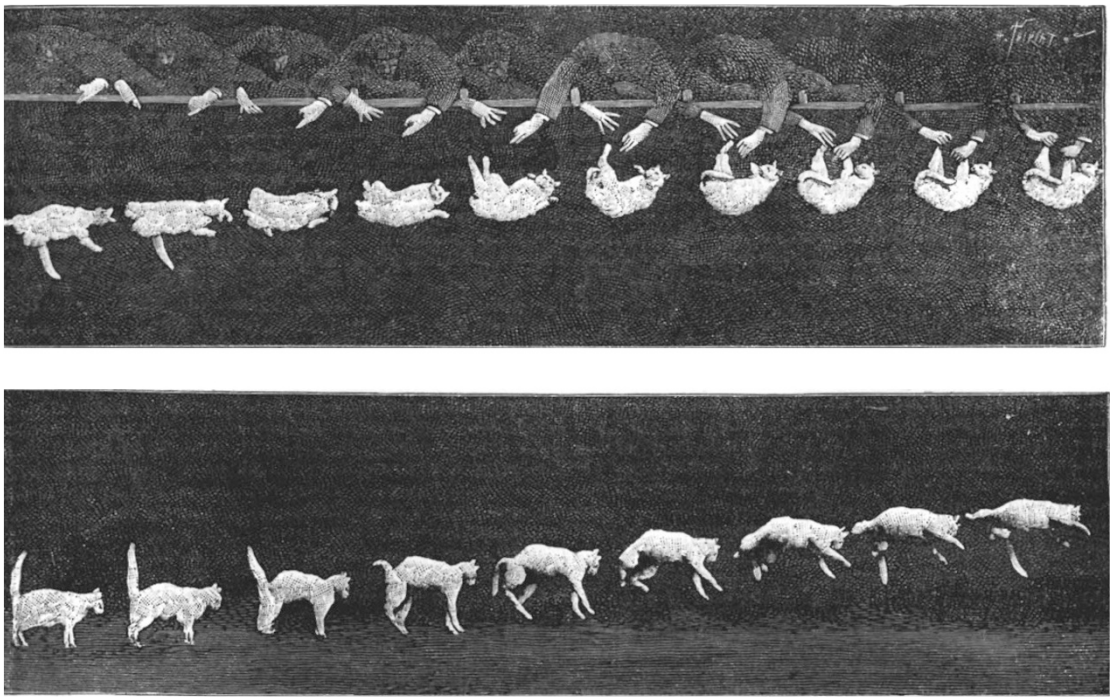

FIG. 1.—Side view of a falling cat. (The series runs from right to left.)

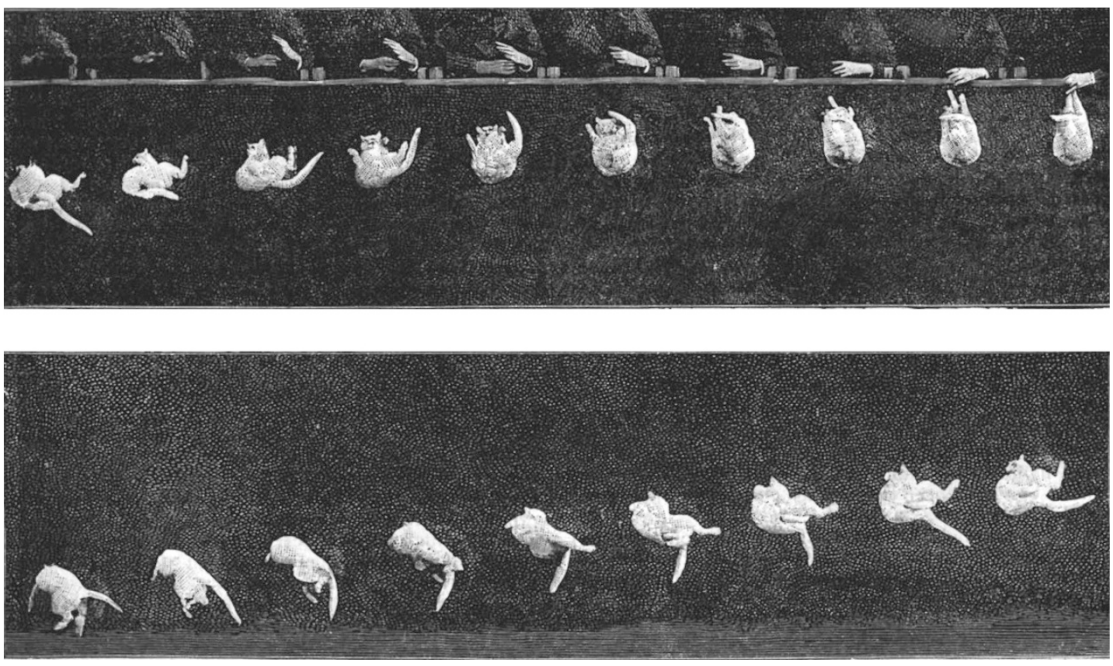

FIG. 2.—End view of a falling cat. (The series runs from right to left.)

The rotation of the fore and hind parts of the cat's

body takes place at different stages. At first the twist is almost exclusively confined to the fore part, but when this amounts to about 180 degrees the rear part of the animal turns. M. Marey is of the opinion that an inspection of the figures altogether excludes the idea that the animal uses the hands that let it go as a fulcrum by means of which a movement of rotation is obtained. The first few images in each of the two series show that at the beginning of the fall the cat exhibits no tendency to turn either one side or the other.

As to the hypothesis that the resistance of the air affords a means of turning, this also appears to be inadmissible; because, on account of the tumbling motion of the animal, if this resistance had an appreciable effect, it would produce a rotation in the opposite direction to that observed.

M. Marey thinks that it is the inertia of its own mass that the cat uses to right itself. The torsion couple which produces the action of the muscles of the vertebra acts at first on the forelegs, which have a very small motion of inertia on account of the front feet being foreshortened and pressed against the neck. The hind legs, however, being stretched out and almost perpendicular to the axis of the body, possesses a moment of inertia which opposes motion in the opposite direction to that which the torsion couple tends to produce. In the second phase of the action, the attitude of the feet is reversed, and it is the inertia of the forepart that furnishes a fulcrum for the rotation of the rear.

BIOLOGY IN THE UNITED STATES—A PROSPECT.[1]

THIS volume is slightly larger than its predecessor published in 1891, and is an advance upon it in the number and class of its illustrations. During the interval of publication of the two volumes, much of the work announced in the first one has appeared in full; and the present one shows that although, perhaps, more might be made of the resources of the Wood's Holl Laboratory and its rich surroundings by a better appreciation on the part of the scientific public, there is no falling off in either the energy or enthusiasm of its founders and chief supporters. The ten lectures reported in this volume are chiefly special ones, given by investigators who undertake to review their chosen field of labour, and to set forth the results of their own inquiry—it being an avowed object to bring forward unsettled problems of the day, and discuss them freely. The lectures are published for the first time, with the exception of that which is the most striking of the series and one of the most remarkable contributions to recent biological literature, viz. Prof. C. O. Whitman's thesis on "The Inadequacy of the Cell-theory of Development," originally read before the Zoological Congress of the World's Columbian Exposition, and already reprinted in the *Journal of Morphology*. Prof. Whitman's work in this department dates from his inaugural dissertation for the degree of Doctor of Philosophy in the University of Leipzig, dealing with the embryology of *Clepsine*, in which he laid the foundation of his now famous teloblast theory. The researches which this essay has provoked rank foremost in interest among all those recently devoted to the study of the germinal blastemata.

No one has more assiduously followed up Prof. Whitman's suggestive lines than Prof. E. B. Wilson, whose lecture on "The Mosaic Theory of Development" ranks first in order in the present volume. His recent work on the cell-lineage of *Nereis* is second only to that of Whitman in interest and importance. His present treatise is a review of the embryological work of the last decade in its bearing upon the biogenetic law. Prof. Whitman would seek the secret of organisation in ultimate elements of living matter "for which *idiasomes* seems an appropriate name"; Prof. Wilson, that of differentiation during development in the interaction of the embryo-cells. There next follows a lecture by Dr. E. G. Conklin, on "The Fertilisation of the Ovum," *apropos* of the author's researches into the development of the marine gasteropod *Crepidula plana*.

Lecture iii. is by Prof. Jacques Loeb, "On some Facts and Principles of Physiological Morphology." He first considers the question of "heteromorphosis" or substitution of organs, as illustrated (under the maltreatment of *Antennularia*) by the development of new roots and apices in relation to gravitation, and by root formation at points of contact with solid bodies, in *Margeliss* and other hydroids. He shows that it is possible to obtain roots and polyps at will over various and interchangeable areas, in direct response to modified conditions of growth. There follows this a lecture by Prof. Ryder on "Dynamics in Evolution," which is suggestive but imaginary. New terms and statements of probabilities it does contain, but new facts it does not. Its most interesting portions are those relating to surface tension in its probable bearings on protoplasmic activity; but it appears to us rather more sensational than sound. The comparison of the behaviour of a contracted smoke-ring to an amœba in motion is suggestive, perhaps in a sense not intended by the author. Dr. Watasê follows with a dissertation "On the Nature of Cell Organisation."

Lecture vii. is a very welcome one, by Dr. Howard Ayers, on *Bdellostoma Dombeyi*, *apropos* of its author's work upon the comparative morphology and physiology of the vertebrate ear. He deals at some length with the habits of the animal, and adduces additional evidence for the belief in the primitive, as distinguished from the alleged "by parasitism degenerate" nature of the cyclostomi which has been so generally accepted. He records the fact that the gills vary in number from eleven to thirteen on either side, in individuals from different localities; he regards this variation as indicative of suppression, and the numerically highest as the most primitive type, instituting comparisons with the larval *Amphioxus* which appear to us unsound. We welcome his conclusion that the numerical variation of the gills has nothing to do with the formation of the ductors œsophago-cutaneus. He provisionally argues that *Bdellostoma* is unique in the fact that geographical distribution has had little or no effect upon its anatomical structure; and proposes to recognise but a single genus and species of this form, in a manner curiously mindful of his notorious attempt to similarly unite *Protopterus and Lepidosiren*. Not even allowing for the possibility that the hitherto accepted species of Bdellostomas may be distinct in their habits as well as taxonomically, this proposal appears to us premature, and systematic ichthyologists will certainly not acquiesce to it. In common with most subsequent investigators, he finds himself unable to confirm Beard's alleged discovery of calcified teeth in these creatures. He regards Beard's "bone" as "much hardened horn, produced by the methods used in preparation." This we cannot accept. The cells of Beard's "calcified teeth," although uncalcified, are mesoblastic, and the structure described by him as an "enamel cap" (whatever it may be) certainly does appear in individual sections. He finds that hermaphrodites occur even among old individuals; but while examples possessed of ripe ova and spermatozoa may be forthcoming, he finds them to be rare, and concludes that preponderance of *males* is the ordinary condition. His observations upon the olfactory organ

[1] "Biological Lectures delivered at the Marine Biological Laboratory of Wood's Holl." Vol. ii. (Boston: Ginn and Co., 1894.)