

FLIGHT.—FIGURE OF 8 WAVE THEORY OF WING MOVEMENTS

IN the Proceedings of the Royal Institution of Great Britain for March 1867, Dr. J. Bell Pettigrew, F.R.S., the distinguished curator of the museum of the Royal College of Surgeons of Edinburgh, announced the startling discovery that all wings whatever—those of the insect, bat, or bird—were twisted upon themselves structurally, and that they twisted and untwisted during their action—that in short they formed *mobile helices* or *screws*. In June of the same year (1867), Dr. Pettigrew, following up his admirable researches, read an elaborate memoir "On the Mechanism of Flight" before the Linnean Society of London, wherein he conclusively proves, by a large number of dissections and experiments, in which he greatly excels, that not only is the wing a screw structurally and physiologically, but further that it is a reciprocating screw. He shows, in fact, that the wing, during its oscillations, describes a figure of 8 track similar in some respects to those described by an oar in sculling. This holds true of the vibrating wing of the insect, bat, and bird, when the bodies of these animals are artificially fixed.

When, however, the creatures are liberated, and flying at a high horizontal speed, the figure of 8, as he points out, is curiously enough converted into a wave track, from the wing being carried forward by the body, and from its consequently never being permitted to complete more than a single curve of the 8. This is an entirely new view of the structure and functions of the wing, and one fraught with the deepest possible interest to the aeronautical world. It promises to solve everything. Dr. Pettigrew's remarkable discovery has received an unlooked-for confirmation within the last few months at the hands of Professor Marey, of the College of France, Paris. This gentleman, whose skill in applying the graphic method to physiological inquiry is unequalled, has succeeded in causing the wing of the insect and bird to register their own movements, and has established, by an actual *experimentum crucis*, the absolute correctness of Dr. Pettigrew's views. Professor Marey's mode of registering displays much ingenuity, and is briefly as follows:—"A cylinder revolving at a given speed is enveloped by a sheet of thin paper smeared with lamp black, and to this the tip of the rapidly vibrating wing of the insect is applied in such a manner as to cause it to brush out its track on the blackened paper, which it readily does. A similar result is obtained in the bird by fixing a registering apparatus to the wing and causing the bird to fly in a chamber. In this case the registering apparatus is connected with the cylinder by means of delicate wires, and the registering is effected by means of electricity. In both cases the figure of 8 and wave movements, originally described and figured by Dr. Pettigrew, are faithfully reproduced. The way of a wing in the air has hitherto been regarded as a physiological puzzle of great magnitude; and well it might be, since some insects (the common fly for example) vibrate their wings at the almost inconceivable speed of 300 strokes per second, that is, 18,000 times in a minute!

It should be added that though Professor Marey endorses Dr. Pettigrew's view as to a figure of 8 movement, and has recently admitted his priority in that observation, he is yet by no means of the same opinion as Pettigrew as to the explanation of the mechanical effect of the movements and the influence of the bird's weight. Pettigrew maintains that the wings act as inclined planes in such a way that the bird actually rises by its own weight. Dr. Marey will not admit this at all, and is at issue with the Scotch anatomist on some other matters of moment, as he recently informed the writer. The beautiful and ingenious experiments which Dr. Marey is now carrying on will place these matters beyond conjecture by the light of experiment.

A FALL OF YELLOW RAIN

ON the 14th of February a remarkable yellow rain fell at Gênes. The following details respecting it are given in a letter addressed to M. Ad. Quetelet by M. G. Boccardo, director of the Technical Institute of Gênes, who examined it in concert with Dr. Castellani, professor of chemistry. The quantitative analysis gave the following results:—

Water	6'490	per cent.
Nitrogenous organic substances	6'611	"
Sand and clay	65'618	"
Oxide of iron	14'692	"
Carbonate of lime	8'589	"

Observed narrowly under the microscope, the presence was revealed of a number of spherical or irregular ovoid substances of a cobalt blue colour; corpuscles similar to the spores of *Peziza* or *Permospora*; spores of *Demaziaceæ* or *Spheriaceæ*; a fragment of a *Torulaceæ* (?); corpuscles of a pearly colour, concentrically zoned, probably small grains of fecula; gonidia of lichens; very scarce fragments of *Diatomaceæ*; spores of an olive brown colour; a few fragments of filaments of *Oscillaria*, *Ulothrix*, and *Melosira varians*; a fragment of *Synedra*; a peltate hair from an olive leaf. If, instead of collecting the earth on the morning of the 11th, when it had already been subjected to the action of rain falling for several hours, I had been able (writes M. Boccardo) to observe the phenomenon during the night, at the moment when it was produced, it is very probable that the microscope would have shown the existence of several kinds of Infusoria, as has been the case in several similar instances.

The author notes that the direction of the wind at Gênes during the night of the 13th and 14th was from the south-east, and without being exactly a hurricane as on the preceding few days, was still very strong. The temperature, previously exceptionally low, had risen, and probably did not fall during the night below +4° R. (5° C. or 41° F.) The journals state that on that date a tempest devastated the coasts of Sicily. M. Boccardo, following P. Denza, proposes the theory that the dust came from the coast of Africa. "We ought not to forget," he writes, "that according to Maury's theory of the circulation of the atmosphere, these clouds of dust may well have travelled a long distance before touching the soil of Italy, coming from beyond the Atlantic, like those which in 1846 spread from Guiana to the Azores, over the south of France and the whole of Italy."

RELICS OF NON-HISTORIC TIMES IN JERSEY

CONSERVATION *v.* DESTRUCTION

ON the 18th of May information was received from Jersey of the partial demolition of some tumuli, hitherto undescribed in that island; and, accordingly, two gentlemen, interested in the conservation of all ancient monuments, resolved to make a tour of inspection of the pre-historic remains in Jersey without delay, and the following is the result of the inspection:—The time was necessarily brief, occupying only two days, the party arriving at Jersey at 11 A.M. on the 19th, and leaving the island at 6.45 A.M. on the 21st. A summary of the route taken may be useful to tourists and others who may wish to visit all the pre-historic stone monuments in Jersey, as far as they are known at present. Leaving St. Helier's by the St. Aubin's road, the first attraction is the Ville Nouaux Cromlech, not far from the first martello tower. This structure was examined last year by leave of M. de Quetteville, the proprietor, and described at the time.

As now exposed to view, this cromlech appears to be