

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. Boccoardo, 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. Boccoardo) 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. Boccoardo, 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



an elongated *allée couverte*, nearly due east and west, measuring 35 feet in length. Its sides, about four feet apart, are as nearly as possible parallel, although there are indications of the avenue being narrowed towards its eastern extremity, as we should expect to find. The side blocks of stone average from 4 to 5 feet in height, and number eleven on the northern and seven on the southern side, the western end being closed by a fine single slab. The interstices between these blocks are roughly filled up with irregularly shaped smaller stones, evidently built in to prevent the exterior earth and soil of the superimposed tumulus from falling into the sepulchral grotto.

There must have been formerly at least nine cap-stones; of these, two have been removed, as observed above, whilst the whole fabric appears to have been tilted, with an inclination to the south, probably caused either by the unequal pressure of the accumulated sand-drift on the northern side, or by the removal of the ballast from its southern supports. It is difficult to determine whether all the cap-stones are in their original positions, or whether some of them have not slipped between the side blocks from their summits.

Several urns, tulip shaped, &c., with a cylindrical stone muller, were brought back to Guernsey from this cromlech, and are now deposited in Mr. Lukis's museum.

Not far to the north of this spot is a semicircle of stones, which presents a suspicious appearance.

It is much to be wished that the tenant of this field would prevent the causes of the filthy state in which this cromlech is at present. The stones themselves have not been disturbed since the last exploration.

Entering St. Laurence's parish, to the right of the road, on the hill above the vineries, is La Blanche Pierre, a menhir which is fortunately still preserved. The route is next taken to the north-west, through St. Peter's parish to St. Ouen's, and the small hamlet of Trodais. Here the party visited M. Lefevre, who in the course of agricultural operations, has removed a large portion of tumuli on his property, and who, six years ago, found within one of them, and has in his possession, a remarkable cinerary urn with four handles, evidently for suspension. The upper portion of this urn, which is hand-made, not turned, is likewise decorated with an ornamental border, consisting of horizontal lines, so arranged as to form three triangles between each handle. It is of a different and later type than the urns discovered in the cromlechs of these islands. M. Lefevre accompanied his visitors to the sites of the tumuli. These curious mounds are in two groups, one group being called *Les Hougues de Millais*, on one spur of the hills overlooking L'Etac and St. Ouen's bay, to N.W. of *La Robeline*, and the other on a similar spur to the S.E. of the former, about 800 yards distant, in a line with St. Ouen's windmill; these last are called *Les Monts de Grantez*. A portion only of one of the *Hougues* remains, and exhibits a series of cap-stones, five in number, of which four remain, supported by a dry-walling of smaller slabs, forming a tunnel about 18 feet long, which lies east and west, and was blocked at either end with a broad stone, of which the west one alone is *in situ*. It presents an exact parallel to the *Creux des Faias*, which existed till lately in St. Peter's parish, Guernsey, a few hundred yards west of the menhir at Les Paysans; but which has been swept entirely away. A granite muller was picked up here by the visitors, which also resembled, in a remarkable manner, a similar one picked up but a day or two before by the same gentleman, on the site of the *Creux des Faias*, in Guernsey, showing an identity of manufacture and a contemporaneity of construction of the tumuli in both islands.

Leaving Les Hougues, and after visiting Les Monts de Grantez, St. Ouen's church, which is being magnificently restored, was examined, and a worked stone of the Neolithic period picked up in the churchyard. Pursuing the circuit of ancient remains, the route descends towards the

sea by St. Ouen's pond, where, in the Val de la Mare, St. Peter's parish, are *Les Trois Roches*, in all probability a portion of a cyclolith. Two only are upright, the third lying prone at a little distance and not visible at first sight, until one approaches close to it. The ground being marshy it has formed a pit for itself. The upright stones have been apparently worked into shape on their summits, whilst their sides are almost polished from cattle rubbing against them. The new road is now traversed through the western portion of St. Brelade's parish, between the dreary *dunes of Les Quenvais*, and ascending by *La Pulente* on to the hills of La Moye; a kitchen-midden is to be found at the summit of the ascent, where the soil has been scarpred in the formation of the road, a mass of limpet, ormer, mussel, and other shells, at some feet in depth below the surface of the original soil.

The famous menhir of Le Quesnel, which stood so picturesquely to the south of this spot this time last year, has fallen a victim, and in its place a large quarry yawns; but in Le Marais, close by, is a portion of a circle, and an alignment, in connection with the former menhir, is still to be traced. Close to Moye signal staff a natural cropping up of the rock presents a striking resemblance to a cromlech and circle round it. About half a mile from Le Quesnel, and directly above La Corbière Point, is a fine single stone Dolmen called *La Table des Marthes*, beneath which were found some bronzed implements many years since.

Over the granite quarries of La Fosse Vaurin, is a curious natural work which, aided by the hand of man, presents the appearance of two basins with a channel for emptying one, whilst the fissures to the east resemble a cross, the work, perhaps, of some hermit in mediæval times. Several mullers, worked stones, &c., were found in the locality during this brief visit, and brought back to Mr. Lukis's collection. A seven miles' drive brings one back to St. Helier's. This day's visitation occupied from 11 A.M., until 9 P.M., but much time was spent in sketching and measuring, searching for stone implements, &c. The find for the day was tolerably good, viz.:—Ville Nouaux Cromlech, 1; Les Hougues de Millais, 1; St. Ouen's churchyard, 1; Les Trois Roches, 3; La Moye, 5 stone implements. S. P. OLIVER, Lieut. R.A.

40, Hauteville, Guernsey

#### SOUNDINGS AND DREDGINGS BY THE UNITED STATES COAST SURVEY

IN the office of the Coast Survey at Washington there are about 9,000 specimens of various kinds of marine animals which were brought up by the sounding lead from the sea-bottom, in the region between the shore of Florida and adjacent States and the outer edge of the Gulf Stream, and descending to a depth of 1,500 fathoms nearly. The dredge has been but comparatively little used along the coast of the United States, and that so many specimens were collected by the lead alone is due to the persevering care of the late superintendent of the survey, Prof. A. D. Bache, and to the instructions which he gave to the hydrographical officers. Of course, specimens brought up by the lead can include the smaller animals only, such as Foraminifera, Diatomaceæ, and such like; for the larger animals, the dredge must be employed.

The work thus begun has been resumed by the present superintendent of the Coast Survey, Prof. B. Peirce. The surveying parties are instructed to take observations of the depth, velocity, and direction of the Gulf Stream, the temperature and density of the water at different depths, and of the Fauna from the surface down to the bottom. By these researches we may hope that our knowledge of the phenomena of the Gulf Stream will be increased, particularly as regards its powers of transportation from shallow to deeper water, or along its bed, besides its action in forming deposits in particular localities, and its