

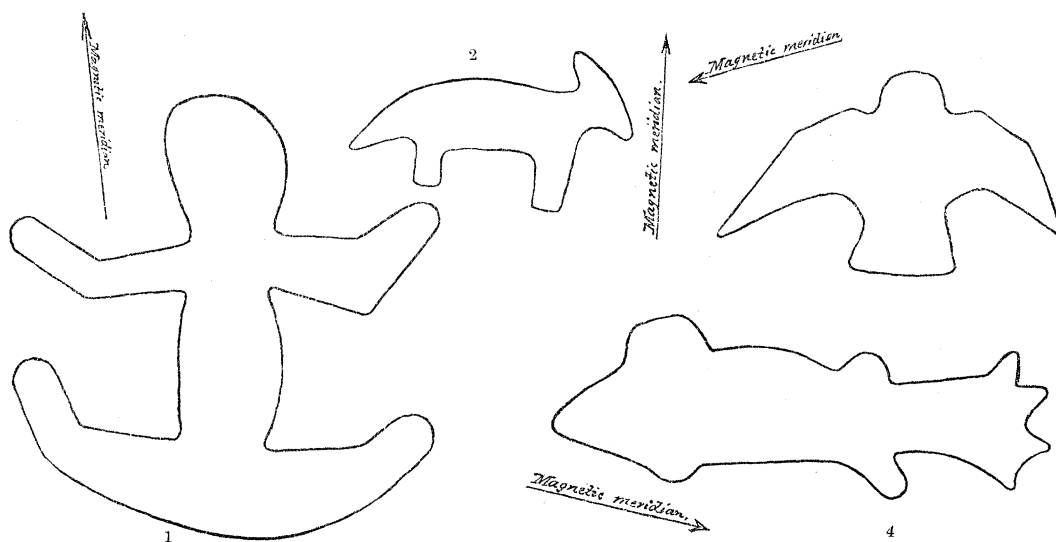
eral other effigies, and thirty or forty mounds and embankments, on the same terrace with the birds, which have been removed in grading streets and lots.

No. 3 is near Richmond Station, on a terrace about twenty-four feet above the river. It is seventy-six feet in an air line from tip to tip of the wings; and the body, with head and tail, is forty-four feet in length. The body, to the first joint of the wings, is fifteen inches in height. Formerly a number of ordinary mounds existed in the immediate vicinity of this effigy.

No. 4 is situated near the village of Dakota,

be enumerated from all the published surveys together.

The effigies surveyed by myself, in addition to the twenty-five in Minnesota, are one in Iowa, and ninety-six in Wisconsin,—a total of a hundred and twenty-two to the present time. On critically examining their delineations, very important differences in class and style from those farther east, portrayed in Lapham's work, are discernible; so that one is irresistibly drawn to the inference, that, before generalizations of value can be made, ten times the number of facts now recorded must be gathered together. Unfortunately, however,



upon a terrace about thirty feet above the river, and is in the midst of nineteen ordinary mounds. Its length is a hundred and ten feet, and the centre of the head is two feet and a half in height. It undoubtedly represents a fish. This is the first case that has been discovered of a fish with fins.

In the limited territory hitherto examined by me in south-western Wisconsin, it would seem, from the numerous ruined effigies, that there formerly existed hundreds of such works. Judge Gale of Galesville estimated that there were fully one thousand effigies in the southern part of Trempeleau county alone; and, from my own observations, I should say a like estimate for Vernon and Crawford counties would be rather under than over the truth. Taking Judge Gale's estimate for Trempeleau county, and reducing it one-half, there would still remain more effigies in the one county than can

that fell destroyer of antiquities, the plough, annually narrows our field of research.

In conclusion, something might be said on the question of the relation between any relics contained in this class of mounds and their shapes. The fact is, however, that little, if any thing, has been understandingly done with a view to ascertain their contents. The few effigies opened along the Mississippi have shown relics and forms of interment similar to those of the common burial-mounds of their neighborhood.

T. H. LEWIS.

RICHET ON MENTAL SUGGESTION.

IN the *Revue philosophique* for December, Mr. Richet gives an account of some experiments in mental suggestion, and attempts to estimate their value by means of the theory of probabilities. Men-

tal suggestion is Richet's contribution towards the task of naming the new phenomenon which is just now struggling for recognition, and which has been hitherto variously designated as 'thought-transference,' 'mind-reading,' and 'telepathy.' 'Thought-transference,' it strikes us, is the worst of these names, and 'telepathy' the best; but, as it is desirable that a phenomenon should not be too rigidly named before it is known what the phenomenon is, we shall make trial for the present of the new term, 'mental suggestion.'

Richet says very happily that the courage of the scientific man consists not only in making experiments dangerous to life upon cholera, rabies, and the liquefaction of gases, but also in exposing his reputation to blemish by advocating a theory which is generally discredited. Richet has taken his courage in his hand, and has published an article in which he claims to have established a strong probability in favor of mental suggestion. We venture to believe that the careful reader will come to the conclusion that to offer such unsatisfactory experiments, so inadequately treated, was a greater strain upon his courage than the novelty of what he attempts to prove. The Society for psychical research has already established a strong presumption in favor of mental action at a distance. Richet's experiments are not to be compared with those of the society, either in the care with which they were performed or the accuracy with which they are described; and his unfamiliarity with the theory of probabilities renders his numerical deductions, except the most obvious ones, misleading and useless.

The experiments are mainly of four kinds,—guessing the suit of a card drawn at hazard from a full pack, guessing a photograph drawn at hazard from a set of six, finding a watch hidden under one of several orange-trees by means of the vibrations of a stick, and spelling out names by means of table-rappings. There is a great deal that is interesting and suggestive in these experiments, and it is a pity that they are not more convincing. It will hardly be believed that in guessing cards the author does not state whether the two persons engaged in the experiment are in contact or not. Such remarkable things are done nowadays in any parlor by muscle-reading, that no experiment in which there is contact is of the slightest weight in establishing mental suggestion. Certain precautions, the author says, are indispensable,—the cards should be a full pack; the one drawn should be returned after each trial; the person who looks at the card should abstain from every word, from every indication, however imperceptible it may be,—but he omits to say whether he is hand in hand with the person who guesses or not. Doubtless he is not; but an experiment in which so essential a circumstance as this is left to be inferred by the reader is not the kind of experiment that carries conviction with it. The conditions under which the photographs were guessed remain equally undescribed; but the remark, "It is necessary to eliminate every sign, whether in the direction of the eyes or in the expression, by which an indication can be given,"

makes it plain that the simple precaution of putting the performers in such a position that it should be impossible to give any indication by the expression or the direction of the eyes, was not attended to. We pass over the experiments in finding a watch hidden under orange-trees, for the reason, that, in order to attribute any weight to them, it would be necessary to know, among other things, where the person stands who has hidden the watch, and whether the one who finds it is blindfolded or not. That the experiments were performed in a garden in the environs of Paris, that the orange-trees were cultivated in boxes, and that they stood in two rows, are the only details that are given.

The last series of experiments was made by Richet and five of his friends,—friends from infancy, intelligent men, well-instructed, and not at all mystical,—two of whom are mediums. Three of these men sit at one table,—the rapping-table,—and two, A and B, at another. Some one thinks of a name. A moves a pencil along an alphabet which is on the table in front of him; when he reaches a certain letter, the other table, by rapping, rings a bell, and B writes down the letter indicated. In this way something like the name thought of is written down,—Jeanr for Jfard, Fqgdem for Esther, Dierooreg for Cheuvreux, and, the only very good one, Cheval for Chevalon. The person who has the name in his mind *n'est ni à la table ni à l'alphabet*; but, to such a degree does Mr. Richet's talent for incomplete description pursue him, it is not said that he is standing where he cannot see the alphabet. If that is the case, the experiment is a very extraordinary one, totally different from simply divining what another person has in his mind. The medium, who sits laughing, talking, and singing with his friends, is required to give his table a vigorous shaking at the instant that two persons near him, who are thinking of the letters of the alphabet, happen to think of the same letter. Such magic as this throws even the ghosts of the English society into the shade; and the observer will need to pile Pelion upon Ossa by way of proof, before he can hope to gain credence for it.

Admitting that Richet's experiments were performed with a rigor with which they are not described, his estimation of the improbability of their results arising by chance falls far short of the truth. He says, after combining the results of all his experiments,—those made with mediums, with 'sensitives,' and with the non-hypnotizable,—that the probability in favor of mental suggestion may be represented by $\frac{3}{4}$. This number is the ratio of the difference between the actual number and the probable number of successes to the whole number of trials. But a comparison of this sort affords no measure of the improbability of the observed facts being the result of chance. It is not the deviation from an average, but the probability that a given deviation should arise, that gives the value of the evidence in favor of the operation of a cause. Richet does not seem to know that there is a mathematical formula by which this probability is determined. For instance: in three series of experiments in guess-

ing cards, he made, in all, 2,927 trials, and obtained 789 successes instead of 732, which is the number that chance alone would lead him to expect. The probability that the actual number of successes shall differ from the probable number in either direction by so much as 57 in 2,927 trials (by λ in s trials, say) is approximately, —

$$1 - \frac{2}{\sqrt{\pi}} \int_0^{\lambda} \sqrt{2pq} e^{-t^2} dt,$$

which gives in the present case $\frac{1}{70}$; that is to say, there is in reality one chance in seventy of so great a deviation arising by accident, while Richet would make it fifty in fifty-one.

We repeat that many of Mr. Richet's experiments are interesting, and the results very striking. It is a pity that they are not more effective than they are in placing the question of mental suggestion upon a scientific basis. CHRISTINE LADD FRANKLIN.

THE DIMENSIONS OF SHIPS.

I HAVE often thought, that, in practising the art of ship-building, men have too much neglected the study of the forms of the fish which make the waters their permanent habitation, and are designed for the most part to attain the highest degree of velocity in the pursuit of their prey. No doubt, the case of a ship partly, and that of a fish wholly, immersed, are not strictly parallel; but they offer very many points for comparison of which we may avail ourselves.

A fish makes use of its tail-fin as the chief and nearly sole instrument of propulsion; and, in the adoption of the screw-propeller in preference to the old side-wheels, the steamers of the present day have secured a great advantage over the old forms. In the proportion of length to those of breadth and depth, however, although there has of late been some improvement, there would appear to be a lingering tendency to hold by the old mistaken idea that a ship was rather to be regarded as a wedge to cut the water than as occupying the space of a wave of displacement; and so we have ships nine, ten, or even eleven times as long as broad, and twenty times the length that they have draught. Now, knowing as we do the magnitude of the skin-resistance in ships, and its smallness in the oily coats of fishes, one would expect that the length of the latter would be greater proportionally than that of the former, if ships were built in the proper form to secure a high velocity. But what is the fact? On an average of sixteen fresh-water fish delineated in Daniell, I find that the extreme length, inclusive of the tail-fin, is four and twenty-two hundredths times that of the extreme depth exclusive of the dorsal and ventral fins. The average breadth will be perhaps one-half of the depth, making the proportion to length about 1:8.

Abstract of a paper by Dr. J. P. JOULE, published in the Proceedings of the Manchester literary and philosophical society.

On an average of three species of whale, the narwhal, Greenland shark, dolphin, and the porpoise, I find from Scoresby and other authorities the proportion of either depth or breadth to length to be about 1:4.7, they having nearly circular sections. Therefore it appears, that, while in ships the proportion of length to width of midship immersion is 5:1, that of the shark, the porpoise, or dolphin, is not more than 1.5:1.

Dr. Scoresby, in his 'Arctic regions,' gives twelve miles per hour as the utmost speed of the whale; but Mr. Baxendell gives it a velocity approaching twenty miles. I had an opportunity of witnessing the wonderful swimming-powers of the porpoise during a voyage to the Clyde in the Owl steamer on the 29th of June last. About eight A.M., the sea being calm near the Mull of Galloway, we were beset by a shoal of these animals, which raced with the ship, and kept alongside for three or four minutes with the greatest ease. They swam in twos and threes, at a foot or two distant from one another, several approaching within ten feet of the vessel, which was steaming at the rate of thirteen and four-tenths statute miles per hour. If such a velocity can be maintained by the porpoise, with its comparatively bluff figure-head, we may surely expect a much higher velocity in the case of fish more obviously designed for speed.

My son tells me that in a voyage of the *Malvina* from Leith to London he had observed at night two fishes of about a yard long which kept for a considerable time in advance of the cutwater of the ship, being visible by their phosphorescent light. The ship was at the time steaming at the rate of fifteen and two-tenths statute miles per hour.

The investigation of the resistance of solids moving in fluids has been taken up theoretically by Thomson, Stokes, Rankine, and practically by Froude, who has found that the surface friction in long iron ships is more than fifty-eight per cent of the whole. Froude recognized the study of the forms of animal life in guiding us to practical conclusions.

From the above considerations, I am inclined to believe that a length of not more than five to one of breadth would be better than the extreme proportions of ships now in vogue, and that the greatest breadth should be considerably in advance of the midship.

RECENT TRAVELS IN ARABIA.

FROM the recently printed account of Mr. Charles Huber's mission in Arabia we cull some notes of general interest.

On an excursion to the great mountain Jebel Aga, the party camped at the entrance of the Tuarin valley, near the ruins of the little fortress El Asfar. Three palms grow here; and there is a little spring whose temperature, 75° F., indicates the heat of the soil and rock in this arid region. Around the ruins were traces of cultivation and abandoned wells. At a short distance the traveller was fortunate enough