less, according to the laws of priority, must stand. The "toothless diver" of Marsh was *far from being toothless,* as is shown by the splendid material in the Carnegie Museum, as well as by Professor Marsh's own type specimen.

W. J. HOLLAND

CARNEGIE MUSEUM,
January 6, 1908

"TROTTING AND PACING, DOMINANT AND RECESSIVE?"

To THE EDITOR OF SCIENCE: I have noted with interest, in your issue for December 27, on page 908, the communication of Mr. W. Bateson, under the caption "Trotting and Pacing, Dominant and Recessive?" Regarding it I would beg to say that his informants who state that they have "never known a natural trotter produced by two natural pacers," while stating the results of their own experience, have, in that experience, missed, very evidently, a result that is not uncommon in the breeding of harness horses. I have personally known of numerous cases in which the produce from the mating of natural pacers has produced a natural trotter; and, as a matter of direct evidence, may cite a case which has very lately come under my notice.

One of the most celebrated pacing stallions of recent times is Direct Hal. He never lost a race and his record, 2.04¼, made in the first and only season (1902) that he was raced, has never been beaten by a stallion under the same conditions. Direct Hal was a natural pacer. His sire, Direct, was a natural trotter, and was first trained to trot, and given a record of 2.18¼ at that gait. He was then taught to pace and given a record of 2.05½ at that gait. He was himself a trotting-bred horse, but the majority of his get have been pacers. The dam of Direct Hal was Bessie Hal, a pacing mare, and pacing bred with the exception of a trotting cross on her dam's side.

One of the most celebrated pacing mares of recent times is Lady of the Manor. She won nearly all her races and also took a record of 2.04¼; which, when made (1899), was the fastest on record for a pacer of her sex. She was by Mambrino King, a trotting horse, with but

a remote and attenuated pacing inheritance. Her dam was also a trotting mare, strongly trotting bred and with no near, or, supposedly, influential, pacing blood. Nevertheless, Lady of the Manor was a natural pacer. As she was bred to trot, she was first trained to trot; hobbles and heavy shoes and toe-weights being used to force her to adopt that gait, but the effort was unsuccessful. She was then allowed to pace, with the result above noticed.

After their retirement from racing, these two remarkable pacers were mated, and one of their produce, a filly, foaled in 1905, is now owned by a gentleman of my acquaintance, resident in this city, who has her in training at a farm near here. Both this gentleman and his trainer inform me that this filly is a square trotter, that has, since under their observation, never been seen to pace, either in or out of harness.

This is only one case of a number of similar ones that could be cited.

The whole question of the relation between the trot and the pace is a perplexing one. I have, I may say, devoted many years to its study, during which I have been afforded an embarrassment of riches so far as material for investigation was concerned. During this period I have at various times been of various opinions, which, for the time being, I have believed to be definitely established, but have again and again been unsettled as new evidence, not to be gainsaid, has presented itself. One thing is, however, incontestably true, viz., that pacers are much oftener produced by trotting parents, than trotters by pacing parents. Personally, I much doubt what Mr. Bateson says he has been given to understand —"that the distinction between the natural trotter and the natural pacer is so definite that doutbful cases are exceptional"—and consider the reverse to be, if anything, as probable.

JOHN L. HERVEY

INHERITANCE OF FLUCTUATING VARIATIONS

To THE EDITOR OF SCIENCE: Referring to Dr. Ortmann's interesting article in SCIENCE of November 29, I should like to ask him how he accounts for the well-known phenomenon of