Make-believe.

I CAN well believe in Sally meaning a joke. Animals have a keen sense of "making believe" which is the essence of *play*. A child's first game is bo-peep—a make-believe. When a pair of friendly dogs have a jolly tussle, they make believe to engage in deadly combat.

A striking instance of this occurred to me some years back. I gave a dead mouse to a kitten. It was the first time she had seen one, and she sniffed at it inquisitively before deciding on tossing it about. A pair of slippers lay on the floor. She dropped it into one of them, and *immediately* proceeded to look for it most zealously in the other slipper, till I took up the first, which contained her booty; then she showed that it was no real lack of memory that had sent her on the bootless search.

The law allowed to game, when hunted for recreation, is perhaps the most marked evidence of the make-believe element which is to be found in the play of civilized adults.

Dublin, July 16.

MARCUS M. HARTOG.

Dogs and Fire.

AN unrecorded type of the pluck of the fox-terrier was demonstrated to me recently. A young dog two or three years old, the property of Mr. Doyle, of Loretto Terrace, Bray, goes for fire with as much zeal as any of his race go for rats. When a newspaper thoroughly ablaze is thrown down, he stamps upon it with frequent short rushes till it is extinguished, and then worries the scorched remains before asking for a fresh opportunity. He gets excited and keen on being shown a crumpled newspaper or a match-box.

The possibility thus shown of educating dogs to tackle fire gives additional point to my friend Dr. Sigerson's published suggestion to use dogs as companions to night-watchmen, based on their keenness of scent.

Dublin, July 16.

MARCUS M. HARTOG.

"The Theorem of the Bride."

REFERRING to the last paragraph of the review of my "Greek Geometry from Thales to Euclid" which appeared in *NATURE* of June 20 (p. 172) it may interest some of your readers to know that since the publication of my book I have found the expression—*τῆς νύμφης θεώρημα*—in the Scholia on the "Elements of Euclid." See "Euclid's Elementa," ed. Heiberg, vol. v. p. 217, Lipsia, 1888.

The expression seems to have been a common name of Euclid i. 47.

GEORGE J. ALLMAN.

Belsito, Milford, Lymington, July 18.

RECENT RESEARCHES INTO THE ORIGIN AND AGE OF THE HIGHLANDS OF SCOT- LAND AND THE WEST OF IRELAND.¹

I.

THE records of geological history, like those of the human race, become more fragmentary and illegible, the farther back we trace them into the past. While the younger rocks of the earth's crust have been made to yield a more or less connected story of geographical and biological evolution, the oldest rocks have till comparatively lately been neglected, or have been tacitly left to mere speculation and conjecture. Only within the last few years have these ancient formations been seriously and sedulously attacked by scientific methods of inquiry. Though the progress of investigation has necessarily been slow, a steady advance in knowledge can be chronicled. There is a curious fascination in this department of geology. These venerable rocks reveal to us the oldest known part of the outer shell of our planet. The palimpsest of the earth's surface has been written over again and again during the long ages of geological history; but down among these bottom-rocks we reach the earliest recognizable inscriptions, and come as near towards the beginning of things as geological evidence by itself is ever likely to lead us. These records carry us back to a

time anterior to that of the oldest fossiliferous formations, possibly to an epoch that preceded the appearance of vegetable or animal life on the globe. They reveal to us the very foundations of the earth's crust, on which all other known rocks rest, and out of the waste of which the greater part of these rocks has been formed.

Within the last ten years, after prolonged misconception and neglect, the most ancient rocks of the British Isles have come to occupy a foremost place among the researches of the geologists of this country. The tracts where they are now exposed to view, often among the wildest mountains, or "placed far amid the melancholy main," have become favourite geological hunting-grounds, and have furnished a notable amount of material for those disputes and combats which seem to form a necessary element in geological progress. Avoiding, as far as possible, matters of controversy, I propose this evening to offer a brief outline of the actual state of knowledge, up to the present time, of the history of those ancient crystalline masses of which our north-western mountains are composed.¹ The story is a somewhat involved and complicated one. But its main points may perhaps be conveniently grasped, if we bear in mind that they naturally group themselves into four sections: (1) the Archæan period; (2) the Cambrian period; (3) the Lower Silurian period; (4) the period of the younger Schists.

Let me at the outset remark that in the investigation of these early ages of geological history we enjoy in this country a special advantage. The British Isles stand on the oceanic border of a great continental region. They are therefore placed along that critical belt where not only have terrestrial disturbances been especially numerous and violent from the earliest geological times, but where an oscillation upward or downward of a few hundred feet has sufficed to make all the difference between land and sea. In the heart of a continent, as, for example, over the vast plains of Russia, long cycles of geological time have passed without serious disturbance of any kind. To this day some of the ancient Palæozoic sediments in that region, for hundreds of square miles in extent, lie as level as when they were deposited on the sea-floor. They have been uplifted bodily into land, but still remain little more than mere hardened mud and sand. In Western Europe, on the other hand, where from the remotest geological antiquity the oscillations and dislocations have been innumerable, every successive continental uplift has recorded itself in some crumbling or fracture of the rocks. Hence in the geological map of that region the various formations form a pattern of exceeding complexity, while in the maps of Eastern Europe each of them covers a broad unbroken expanse.

I.—The Archæan Period.

The oldest known rocks of Europe, now generally termed Archæan, are well exposed along the north-western borders of the continental area from the extreme north of Scandinavia, by the west coast of Scotland, to Galway Bay in the west of Ireland, a total distance of some 1600 miles. They give rise to topographical features which, where fully developed, strongly distinguish them from all younger formations. Nowhere else can such extraordinary unevenness of surface be found. Knobs, hummocks, and ridges of bare or almost bare rock, separated by narrow gullies or by wider winding valleys, roughen the ground in every direction. In the hollows lie innumerable tarns and lakes, or flat tracts of bog where lakes once were. In some districts, indeed, there is as much water as land in a given number of square miles. On a large scale, this type of scenery is perhaps

¹ It would be obviously out of place to include here references to the voluminous literature of the subject. A condensed summary will be found in the Report by the officers of the Geological Survey, Quart. Journ. Geol. Soc., vol. xliv., 1888.

¹ The Friday evening lecture delivered at the Royal Institution on June 7, by Dr. Archibald Geikie, F.R.S.