IN NATURE (vol. xxix. p. 596) there is a letter signed James Graves, in which he says, "as to the magpie or any other bird being able to fix dates exactly to the day, it is unproved and incredible." I do not know what may be the case in regard to birds-nestbuilding, but I can give two instances of the regularity with which birds arrive at certain localities *en route* northward, whatever may be the state of the weather. During a ten years' residence on the shores of Hudson's Bay, the first Canada goose of the spring migration was seen and generally shot on April 23. At Toronto on Lake Ontario, large flocks of a pretty little plover called the "black-heart," from a black patch on its breast, pass along the islands, flying northward, on St. George's Day (April 23), and are seldom or never seen even a day before or a day after that date. The poor little birds have a sad time of it for six or eight hours, as a number of sportsmen go out for the occasion and knock them down by the half-dozen or more at every shot. In this case, as in the other, wind and weather appear to cause no difference JOHN RAE

4, Addison Gardens, April 25

THE ABSORPTION OF WATER BY PLANTS

AN ingenious instrument has lately been described by Dr. J. W. Moll (*Archives Neerlandaises*, i. xviii.) under the name of the Potometer. It is a modification of Sachs' apparatus for determining the amount of water which a cut branch absorbs in a given time. I have been for some years in the habit of using a form of Sachs' instrument, differing in principle from Moll's apparatus, but resembling it in being especially adapted for making observations at short intervals of time. As the subject of transmission of water through wood is now attracting attention among physiologists, it seems worth while to describe my instrument.

A short piece of thick indiarubber tube is slipped over the cut end of a branch and firmly attached to it by wire ties; the other end of the rubber tube being securely fitted to a glass tube which is filled with water. The other end of the glass tube is closed by an indiarubber cork through which passes a coarse thermometer tube. The apparatus is now fixed so that the free end of the thermometer tube dips into water. As the leaves evaporate the water in the glass tube is sucked up by the cut end of the branch, the loss being constantly made up by a current flowing in through the thermometer tube. If then we can estimate the rate of this current we shall know the rate of absorption of water. This is very simply done by allowing, for a few seconds, the thermometer tube to suck in air instead of water; when a column of air a few millimetres in length has been drawn in, the end of the tube is again immersed in water, and the bubble travels rapidly along the thermometer tube, when its speed is measured by means of a chronograph.

This method appears no doubt to be a rough one, and is open to objections; but I believe that it does not give rise to serious errors, and it certainly demonstrates extremely well small changes in the rate of absorption by a cut end of the branch. By means of my instrument observations can be made at very short intervals; for instance, four readings were taken in 1′ 50″; it is therefore well adapted for observing rapid changes in the rate of absorption.

I reserve a full discussion of the merits and demerits of the instrument for a later publication.

Experiments, April 1884.—When a branch is first fitted to the instrument the rate of absorption is extremely rapid, owing to causes which need not here be considered, but after a time the rate of absorption (which diminishes with great rapidity) becomes constant. A branch of Portugal laurel (*Cerasus lusitanica*) was cut at 9 30 a.m., and was not fitted to the apparatus until 10.15 a.m.

The following table shows clearly the rapid decrease in the rate of absorption:— [1]

Times h.	m.	Rate of Absorption
10	18	71
	20	53
	25	40
11	14	26
	35	25
	52	25

Sachs has called attention to the diminution in the absorption which occurs when cut branches are placed in water, and has shown that the absorbing power can be renovated by cutting a fresh surface at the base of the branch. This effect is well shown with my instrument. [1]

The above-mentioned branch of Portugal laurel which had been placed in water at 9.30 a.m. gave a relative rate of absorption of twenty-four at 12.28; at 12.30, between 6 and 7 cm. were cut off, and the branch was again fitted to the machine, the operation lasting one and a half minutes.

Time p.m. h.	m.	Rate of Absorption
12	28	24
	30	fresh surface cut
	31½	branch replaced
	33	35
	35	30
	39	28
	45	26
	54	26

When the rate of absorption has become constant, any variation in dampness or dryness of the air causes variations in the transpiration of the leaves, and therefore in the rate of absorption. These changes are well shown by my instrument. The following experiment, made with a branch of Portugal laurel shows the amount and rapidity of the increase in absorption caused by exposing the leaves to the sun shining through window-glass:—

Time a.m. h.	m.	Rate of Absorption
10	44	14
	49	14
	55	14
11	0	15
	5	15
	6½	14
		Blind drawn up
	7½?	14
	9	20
	12½	27

Thus in six minutes the rate of absorption had nearly doubled. A similarly rapid effect is seen when the sunlight is cut off, when the rate of absorption falls.

Time h.	m.	Rate of Absorption
12	5	33
	10	32
	10½	blind down
	12½	27
	19½	20
	25	19
	29	18

That is, the rate of absorption diminished in the proportion of 100:56 in twenty-four minutes, when the sunlight was cut off. In the same way the effect of opening a window and thus increasing the evaporation for the leaves, is at once visible in increased rate of movement in the bubble.

Cut Stem of Ivy

Time a.m. h.	m.	s.	Rate of Absorption
10	33	0	32
11	0	0	31
	9	0	window and door opened
	10	40	34
	11	30	37
	12	0	37
	18	0	33
	19	0	window and door shut
	21	30	31
	22	30	29
		40	31

[1] In this and the following tables I have not given the actual quantities of water absorbed, merely the relative rates of absorption.

[1] It need not here be discussed whether the particular phenomenon here described is the same as that described by Sachs.