

Bunsen tube will, in this case, burn with the aid of external heat; but not without some such assistance, because the heat of combustion is so much absorbed by the diluting gases that the temperature of ignition would not otherwise be maintained.

The experiment reminds one of the burning of ammonia, and of a coal-gas flame rendered non-luminous by the admission of steam.

A consideration of Prof. Smithells' method of cone separation by a glass rod (*vide* NATURE, November 1892) might lead to the suspicion that the obstruction of the rod played some part in the phenomenon, but the above explanation is supported by the fact that the copper wire which, when cold, extinguishes a candle flame, does not, when warm, do so.

HERBERT KING.

The School, Wolverhampton, November 2.

The Colours of Guillemots' Eggs.

I AM glad to see that my friend Captain Barrett-Hamilton has written on the above subject, though it seems inconceivable to him that "the beautiful varieties of colouring must help each bird to distinguish her egg from others lying near until they all become stained and soiled." The quotation is from "The Birds of Ireland" (p. 364), in which I put forward, as an opinion, the conclusion that I have been led to after many a day spent in climbing among breeding guillemots.

Discussion of such opinions is to be welcomed, but they must be tested by close observation of the birds and their ways; and the guillemot finding its own egg among many is not the same thing as an animal finding its young, which has voice, smell, movement and expression, nor has the guillemot a nest to find.

It is asked, "Why should each guillemot be provided with a conspicuous private egg-pattern when other sea-birds, her neighbours, have to find their homes without such aid?"

Well, let anyone look down on a guillemot-ledge the last week in May, before the birds have begun to sit close, and he will be struck by the fact that each is provided with a conspicuous egg-pattern, the green eggs contrasting with the white ones and those heavily blotched with the streaked ones; and this is most obvious, even at some distance. I know no other eggs that show such vivid contrasts.

Does this contrast supply any want that the guillemot may have above other birds to enable it to find its egg? Her neighbours, my friend remarks, find their homes without such aid. But then each has her "home." The gulls and cormorants have their nests. Each puffin has its burrow. The razorbills lay much more in separate nooks than guillemots, but still they approach nearest to them both in the nature of their breeding places and in the varieties of egg-colouring. But guillemots lay and sit in packs, often touching one another, on open surfaces of rock (see the plate, "Birds of Ireland," facing p. 362). At first the eggs are often left uncovered and other guillemots alight, lay beside them, and they roll more or less. Must not the special colouring greatly enable the parent bird to find her egg while this is going on? Why should we deny her intelligence in a matter that concerns her, even though other birds are satisfied if they know the way to their nests and do not seem to distinguish whether the eggs in them are their own or not. Thus the cuckoo's egg is unquestioningly accepted by the foster-mother.

It is objected that my suggestion about the colour helping guillemots to distinguish their eggs is disproved by the subsequent admission that they all become stained and soiled as incubation advances; but at that stage each bird clings to her treasure and never leaves it, unless her mate relieves her (a point which needs proof).

The colouring of the eggs of this species is not protective, for it makes them gaudy. It is peculiar, and why should it not be useful during laying-time considering the very peculiar conditions under which guillemots breed? They sometimes come down with a thump among others which are hatching, they sometimes fight, they are awkward on their feet; eggs are not only moved, but many are thrown down, broken or lost in pools.

I wish some ornithologist would contrast from observation the guillemots' colonies on surfaces of rock with those of other birds that breed in packs without nests. Penguins appear to lay on earth and leave lanes between the nesting-places on which the birds travel on foot. That being so, their eggs would not be in such danger of being rolled about.

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THE TERCENTENARY OF TYCHO BRAHE'S DEATH.

ON October 24, 300 years had elapsed since Tycho Brahe died at Prague, expressing in his last moments the hope that he might not appear to have lived in vain. When saying this he doubtless did not fear that the work he had accomplished might not turn out to be of permanent value, but merely regretted that the great goal he had looked forward to from his early youth, the complete reformation of astronomy, had not yet been fully reached. Could he have foreseen how brilliantly Kepler, who stood at his deathbed, was to complete the work, Tycho would have had no fear as to the lasting nature of his reputation.

It is difficult nowadays to realise that only a little more than 300 years ago it was not a self-evident proposition that the science of astronomy could only be firmly established by observing the heavens systematically year after year, and not merely by taking an odd observation now and then. And yet this does not appear to have occurred to anybody before Tycho, as even Copernicus records very few observations taken during his long life, so that the values of most astronomical quantities had still to be borrowed from Ptolemy. But in August 1563 the young Danish noble, then a student at the University of Leipzig, only sixteen years of age, commenced the series of observations which he carried on, with few interruptions, till the end of his life, thirty-eight years later. The instruments he used at first were crude enough, but already at that time the future reformer of practical astronomy was aware that a very inferior instrument may produce good work if all sources of possible errors are investigated and corresponding corrections are applied to the results of the observations. It is also worth noticing that the planets almost from the beginning claimed his undivided attention, so that the youthful observer had perceived that the existing planetary tables could only be improved if the computed places of the planets were systematically compared with observed places and the errors of the tables thus brought to light. Thanks to the great liberality of King Frederic II. of Denmark, Tycho was afterwards able for more than twenty years, with a multitude of instruments of improved construction and assisted by a number of pupils, to follow the motions of the sun, moon and planets, while he at the same time, by his observations of a thousand fixed stars, gave to the world a catalogue of accurate positions of these bodies which took the place of the old catalogue of Ptolemy and held its own for more than a hundred years, until the use of telescopes and clocks of precision enabled Flamsteed to produce much better star places.

That Kepler made use of Tycho Brahe's observations to find the laws which govern the planetary motions and thereby to free the Copernican system from the excentric circles and epicycles which it had taken over from the Ptolemaean system is too well known to require repetition here. But Tycho did a great deal more than merely amassing materials for his successor. Not only was he the first observer who did not assume his instruments to be faultless but who studied their errors of construction, but he was also the first to investigate refraction and to attempt to correct his observations for it, and he succeeded in improving his instruments so much that it is difficult to see how a much greater accuracy could have been attained by succeeding generations, if the telescope had not been invented a few years after his death and if the application of the pendulum to clocks had not simplified many methods of observing. And Tycho was able to deduce many important results from his own observations. By showing that the comets

¹ "Tychoonis Brahe Dani die xxiv Octobris A.D. MDCL defuncti operum primitias De Nova Stella summi civis memor denuo editit Regia Societas Scientiarum Danica. Hauniae, die xxiv Octobris A.D. MDCCCLII." Pp. 16 + 54 ff. + pp. 30; 2 plate.