

towards the end of the eighteenth century. The historical portion of the work shows the evolution of mechanical coal cutting in Great Britain since that date. Descriptions are given of every machine that has been put to practical use, as well as detailed particulars of those that are now in successful operation. The conclusions drawn by the author from his elaborate investigations are that the whole of the coal of Great Britain must be cut by machines, or the industry will find itself in much the same condition as the corn-growing industry, swamped by American production. The pillar and stall method of mining should be replaced by the long wall method, and coal-cutting machines would render blasting unnecessary. The most serious problem to be dealt with is that of cutting coal under a weak roof. The difficulties are perhaps hardly sufficiently emphasised by the author. In a tender coal the roof is crushed down on the machines, or supports have to be set near the faces. These get in the way of a machine. Moreover, machines are so noisy when at work that it is impossible to hear the preliminary warning sounds that the roof generally gives before it breaks down. Eventually, no doubt, it will be ascertained which machine can best be adapted to these conditions, or how the conditions can be modified to suit the machine that promises best.

The author's lucidly written and well illustrated volume cannot fail to prove of great value in directing the attention of mine owners to problems that, at the present time, are of the utmost importance.

Metallography: an Introduction to the Study of the Structure of Metals, chiefly by the Aid of the Microscope. By Arthur H. Hiorns. Pp. xiv + 158; with ninety-six illustrations. (London: Macmillan and Co., Ltd.; New York: The Macmillan Company, 1902.) Price 6s.

THE study of the properties and constitution of metals and alloys has made great progress during the last few years, and has reached a point when it can no longer be neglected by engineers. Steel workers have already received some guidance from the labours of metallographists, chiefly, perhaps, from investigations on what Osmond called the "pathology of metals," and the time may not be far distant when the microscope and the pyrometer will form part of the outfit required in the ordinary testing of materials. Metallography has been regularly taught for some time at many of the technical schools both in this country and in America, and it is remarkable that no text-book on the subject existed in the English language before the publication of the work under review. The researches on which Mr. Hiorns has based his book are scattered and highly specialised, and the acquirement of a general elementary knowledge of the subject has been a difficult matter for the student. The appearance of this book is, therefore, particularly well timed, and it will be eagerly read by many, who will not be disappointed by what they find.

The author has carefully collected most of the important results which have recently been obtained, and has given a terse and lucid summary of them which is surprisingly complete, considering the modest dimensions of the book. He has not devoted much effort to the philosophic aspect of the subject, but that is, perhaps, just as well, inasmuch as the science is in its infancy. With regard to the illustrations, exception may be taken to many of the photomicrographs, which appear to have been taken from a set of poor negatives. On the other hand, they have been beautifully reproduced on special paper. In the study of steel, the author has handicapped himself unnecessarily by using such low powers of magnification that some of the structures of which he speaks cannot be seen at all. Nevertheless, taking the book as a whole, Mr. Hiorns deserves the thanks of his fellow workers and teachers for the useful aid he has given them.

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LETTERS TO THE EDITOR.

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Notes on Young Gulls.

IN northern Bohemia there is a large pond or artificial lake—the Hirschberger Grossteich—with a small, rocky island. This is a favourite breeding-place of gulls. Most of these are *Larus ridibundus*, but some *Sterna hirundo* also breed on the rock. For the purpose of studying its plankton I have repeatedly visited this pond, and have thus had occasion also to make some observations on the gulls which may perhaps be of interest to readers of NATURE.

The rock island which forms the breeding-place is some 400 square metres in extent, and rises in ledges to a height of 15 metres. It is composed of the Cretaceous "Quadersandstein" of those parts, partly bare and partly covered with patches of tough, greenish-brown grass and brighter green thistles. The *Larus ridibundus* nests on this rock are pretty carefully built and entirely composed of dry leaves of bulrushes. There are generally three eggs in each nest. At the height of the breeding season there are about 200 such nests on the rock, besides the much less numerous *Sterna* nests. The nests usually lie on the bare rock close to the margin of a patch of vegetation. The dirty brownish-yellow and black-spotted, mimetic colouring of the down-covering of the young is very effective. When from two to ten days old these young crouch, on being disturbed, against the half-dry grass-tufts and thistles close to their nest, and are then by no means easy to detect. It seems to me that the colouring of these young gulls is not quite the same as that in young of the same species breeding in different environments. It is quite likely that we have here a case of adaptation of the colour of the young to different surroundings, unaccompanied by any difference in the colouring of the adult into which they develop. Older ones, which are already beginning to replace the down with feathers, but in which the head is still entirely covered by the primitive yellowish-brown and black down, do not, as a rule, try to hide themselves in this way, but hurl themselves into the water and swim away rapidly when the boat approaches the rock. The old birds scream loudly and try, first, to entice the intruder away in the usual manner by slowly swimming and flying about near the boat and pretending to be wounded and lame. Besides this, however, they also swoop down on the swimming young, sometimes pushing them right under the water. The first of these actions clearly tends to draw the attention of the intruder away from the young; the second has the very opposite effect. Perhaps it may be accounted for in this way. The young have—this can be observed clearly enough—no idea of the nature of the movements of a boat, and often try to escape it by swimming straight ahead in front of the bow. It gives the impression that the old birds try by their screams to convey instructions to the young about the direction in which they should swim so as better to escape the boat. The young, however, often appear not to understand or to heed these "words of advice," whereupon the old birds pounce down on them and give them one or two good slaps with their wings so as to make them understand and obey. These sharp lessons do not seem to be of much good, however. After being thus slapped, the young continue to swim straight ahead of the boat as stupidly as before.

One of the eggs I brought home and hatched artificially. The bird began to chirp in the egg a few days after I had placed it in the oven, upon which I cut away the blunt end of the eggshell and found, as was natural after hearing the bird give voice, the beak protruding into the air-chamber. On the fourth day after this the young gull left the egg-shell. It then weighed 22.7 gr. We weighed it daily for a fortnight. The average daily gain of weight during this time was 8.5 gr.

The daily increments were quite irregular, varying between 1.6 and 3.2 gr. the first four days, and between 5 and 27.5 gr. the latter ten days. These irregularities were, of course, due to differences in the quantity of the contents of the intestine. One day—not three, as has been stated by Prof. Thomson (NATURE, vol. lxiv, p. 588)—after birth the young bird swam about when placed in water just as well as a young duck. For