LETTERS TO THE EDITOR.

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Humus as a Preservative against Frost.

I HAVE just read a French translation, by my old friend Prof. Henry of the Nancy Forest School, of Wollny's classic work on the decomposition of organic matter. In it I find the statement that spring and autumn frosts are dangerous on peaty soils only when the surface of the latter is dry. Wollny gives no illustrations of this law, but I recently observed one in my garden at Coopers Hill.

Last September I dug up several rose beds on my lawn and sowed them with grass seed, which has produced a fine crop of young grass. This I carefully watered, and the soil in the beds was well trenched and covered with decomposed leaf mould before the seed was sown. The rest of the lawn has not been trenched, probably for thirty years, and the soil under the grass in it; a stiffish loam, is now singularly dry for the time of the year.

On the morning of December 6 there was a slight frost, 31° F. being registered six inches above the grass. At 8 a.m. the lawn was white with rime, except on the new grass, which remained green.

This must be due to the fact that the moist, well-trenched humus soil under the new grass was able to conduct heat from below and thus kept the air in contact with it above the freezing-point, while the dry, compact loam under the old turf could not supply sufficient heat to the old grass to preserve it from freezing. Dry humus, according to Wollny, has a low specific heat and is a bad conductor, while wet humus has a high specific heat and is a good conductor of heat. On another occasion, when snow fell, it melted much sooner on the new grass than on the rest of the garden.

As a further illustration of Wollny's law I may cite the fact that water is let on to cranberry swamps in Carolina when frost is feared during the blossoming period, and also that in north-west India, on clear evenings when frost is feared, vegetable gardens and sugar-cane plantations are irrigated in order to obviate danger from frost.

It is also well known in Germany that if a sphagnum peat bog is to be reproduced, a thin layer of peat must be left at the base of the bog after the upper peat has been removed, and this layer kept carefully under water, as otherwise the drying up and consequent freezing of the peat will kill the moss.

Slight frosts are very prejudicial to vegetation in sub-tropical forests, and, when frost is imminent, the precaution of trenching the soil, removing weeds and irrigating cultivations is extremely important for young sugar-cane and other crops.

Coopers Hill, December 8.

W. R. FISHER.

A possible new Petroleum Field near Naples.

WHEN sailing from Posilipo to Sorrento on August 31 last, at about four or five miles from the nearest land of the Sorrentine Peninsula we encountered a most unmistakable smell of petroleum, just as if a leaking petroleum tank steamer had crossed our bows a few moments previously. Two tracks of the smell were distinctly noticeable, the one at lat. 40° 41' 30", long. 14° 19', and the other at lat. 40° 42', long. 14° 18' 30". A moderate *furano* or southerly wind was blowing at the time, so that in all probability the source of the petroleum was somewhat to the south of the position given.

The only other record of a petroleum source in the immediate vicinity of Naples is that of the Balneum Ollii Petrolei, or *bagno del petrolo*, which formerly existed near the Stufe di Nerone, between Pozzuoli and Baia. This petroleum bath has now quite dried up, but formerly was much praised by mediæval writers for its curative powers in cases of leprosy and cholera, and also because its waters caused the limbs of bathers to rejoice in new found vigour. The last mention of this petroleum bath was by Bartolo in 1679. In the southern Italian provinces petroleum has been found in considerable quantity at San Giovanni Incarico and at Pico in the valley of the Liri in the district of Gaeta. Indeed, in 1878, 600 tons, or almost all the Italian petroleum, came from this source alone. In the last two decades the annual output has much diminished and has become

insignificant as compared with the increased production of the wells in northern Italy. Petroleum has also been stated to occur at Tramutola, on the Gulf of Taranto, and asphalt is recorded from the east side of the Abruzzi, about twenty miles from Pescara on the Adriatic (Redwood).

The depth of the water (80 fathoms) at that part of the Bay of Naples where the smell was noticed is too great for the collection of the petroleum to be commercially practicable. But the long-continued escape of petroleum in the immediate vicinity of the Apennine Limestones of the Sorrentine Peninsula is an indication that deep borings might be successful and might one day yield as profitable a supply of petroleum as the borings in northern Italy. The petroleum fields of the north of Italy near Bologna and Piacenza extend along anticlinals of the Tertiary Limestone, and therefore are geologically similar in many respects to the country in or near which the newly discovered petroleum spring occurs.

R. T. GÜNTHER.

Magdalen College, Oxford, December 13.

Automatic Actions.

As Mr. Dixon points out (p. 102), a mental process frequently repeated becomes automatic.

The impulse passes readily along a path in the brain-cells previously frequently traversed by similar impulses, much as a man who revisits the haunts of his youth may, while in a brown study—that is, while abstracting his mind from conscious direction—find his way unerringly through cross-paths, whereas if he had tried to think out his route he would probably have gone astray.

Mr. Dixon's remarks on the different modes of rising of the horse and cow suggest an explanation. I have hitherto regarded the explanation as due to anatomical differences, but the anatomy of animals has been modified by habit and habit by the necessities of environment.

The horse, which couches on the plain in long grass, rises head first. This method gives him an early view over the surrounding grass and keeps his hind legs (his chief propellers) well under him.

The cow, whose natural lair is under low-hanging boughs, rises tail first. This method allows her till the last moment to keep her eyes upon and her horns presented to an approaching foe.

W. BENTHALL.

December 7.

VARIATION IN FOWLS.

THE recurrence of the large shows of the different varieties of domestic poultry which occurs at this season of the year gives an admirable opportunity to those interested in the subject of studying the characters of the different breeds, and the almost innumerable varieties produced by crossing them. The study of variation has been a favourite pursuit of mine for more than half a century. When Darwin was preparing his works on the "Origin of Species" and on the "Variation of Animals," he was surprised to find, when I was introduced to him by Yarrell at a poultry show, that I had made a large collection of crania of the different varieties. Of these specimens he availed himself largely in his work on "Variation," in which I had the great pleasure of assisting him. I can, therefore, speak with considerable precision of the great change which has taken place in the breeds of poultry during the last fifty years. The figures in Darwin's large work on the "Variation of Animals" were all drawn from birds selected by myself as the most typical specimens of the various races, but I may state that there is not a single figure shown that would not now be repudiated as utterly unworthy of exhibition by the present fanciers, every variety having had its fancy points so greatly increased. To take the figure of the Spanish fowl (shown in chapter vii.), characterised by its white face and large white ear lobe. This represents a fowl which now hardly exists, for the comb has been increased to at least four times the area of that shown by Darwin; the white skin on the face has been so much enlarged as to cause the birds when aged to become

blind unless the skin is cut away. The ear lobe, enlarged in the portrait to many times its natural size, has been again increased, becoming in some cases more than seven inches in length by four or five in breadth when spread out, and offering an area of some thirty square inches. These characters have been carried to such an excess that the breed has become altered from an abundant layer of large eggs into a practically useless variety, and at many shows where they were formerly the most numerous birds exhibited they are now absent, having been, as it were, improved by the fanciers almost out of existence, their laying qualities and utility having almost entirely disappeared. At the Crystal Palace show recently held, where nearly 4000 fowls were exhibited, less than a dozen Spanish put in an appearance, and at the show just opened at the Alexandra Palace, where there are no less than 281 classes for the different varieties of fowls, Spanish are conspicuous by their absence.

Darwin in his list enumerates thirteen varieties of fowls as known to him, namely Game, Malay, Cochin, Dorking, Spanish, Hamburg, Polish, Bantam, Rumpless, Creepers, Frizzled, Silky and Sooties, with their sub-breeds, which he also mentions. In the last Crystal Palace show we had no less than 240 classes, which included all the varieties shown. The old English Dorking breed was the one which has been least changed or modified during the last fifty years, having been merely increased in size. Cochins, which were imported, not, as the name implies, from Cochin China, but from Shanghai,

FIG. 1.—Section of skull of crested fowl.

many hundred miles distant, were originally characterised by profuse fluffy plumage, very small wings, which rendered them almost incapable of flight, a small amount of feather on the tarsus or scaly part of the leg and on the foot. This breed, with all the others, was regarded by Darwin as descended from one wild species, the jungle fowl, *Gallus ferrugineus*. This was one of the very few points in which I differed from my honoured master. I believe that the Cochin descended from another species of wild *Gallus*, which in consequence of its scant power of flight had all passed into a state of domestication and which has long ceased to exist as a wild bird. My opinions are based upon the fact that there is considerable structural difference between the Cochin and the varieties of the *Gallus ferrugineus*. In the Cochin, the axis of the occipital foramen is greatly elongated perpendicularly; in the ordinary fowl its long axis is horizontal. In the Cochin, as originally introduced, a deep median furrow is visible down the frontal bone, which is not present in other fowls. These points could not have been produced by artificial selection. Then again, the voice of the bird was utterly distinct from that of any descendants of *Gallus ferrugineus*. The habits of the birds, as originally introduced, were exceedingly distinct from those of our domesticated species. At the present time the Cochin threatens to become as nearly extinct in England as the Spanish,

having been bred for fancy points, and the tendency to produce feather on the lower extremities has been so enormously exaggerated that in prize specimens the feet are as nearly full plumaged as the wings.

In Darwin's time one of the most remarkable breeds raised by fanciers was the crested, or, as they were then called, the Polish breeds, characterised by a very large tuft of feathers on the top of the head. I paid much attention to these breeds from the singular anatomical peculiarity which they offered; the cranium became greatly modified, the crest taking its rise from a very large bony protuberance of the frontal bones. This in well-developed specimens contained more than half the brain, which, instead of retaining its normal form, became of an hour-glass shape. Specimens of these remarkable skulls were shown by me at the Zoological Society in 1856, figured by Darwin in "Variation" and in my "Poultry Book," from which the accompanying engraving is reproduced. These birds have almost gone out of fashion, there being now no classes for them at the Crystal or Alexandra Palace shows.

If we compare the varieties of poultry as shown at present with those that existed in Darwin's time, we find that the offer of prizes, often of great value, at poultry shows, has induced, not only the formation of innumerable new breeds obtained by crossing and selection, but has led to the exaggeration of the salient points of every variety, as far as is actually possible. If I may presume to quote my own book, on "Table and Market Poultry," I would state: "The fancier has not even a standard of beauty which he regards as final. The greater the extent to which he can make the specimens he produces excel others in fancy points is the object at which he aims; consequently hideous monstrosities are not unfrequently produced and exhibited, the only advantage of which, from a scientific or practical point of view, is to prove the extent to which living organisms are variable under the influence of artificial as opposed to natural selection." W. B. TEGETMEIER.

FRESH LIGHT ON THE ANTARCTIC.¹

THIS is the second narrative of the cruise of the *Southern Cross* and of the first winter spent on Antarctic land. It is written for the same class of the general public as its predecessor by the commander of the expedition. Mr. Bernacchi is, however, a man of scientific training, and although the exuberance of his literary style is sometimes in excess of the strict requirements of science and some of his words do not occur in the dictionary, we are able to gather a few new facts and some corrected impressions from his book. Unfortunately, the book has been written in a hurry, for which there is at least the excuse that the author has set out once more to the South Polar regions; but in one place he acknowledges, and in many places leaves it to be discovered, that he was unable to consult his companions on points that require some explanation.

It is not everyone who can write a book so as to exclude the irrelevant and make the essential attractive to the average reader; yet this, we think, should be the chief justification of a narrative, and especially a second narrative, of an expedition that was in a considerable degree scientific.

The book is divided into two parts, "Narrative" and "Scientific." The narrative need only be referred to in order to remind the reader of the necessary dates which are usually difficult to gather in such works. The *Southern Cross* left London on August 22, 1898, reached Madeira on September 4, left on the 5th, touched at St. Cruz on

¹ "To the South Polar Regions. Expedition of 1898-1900." By Louis Bernacchi, F.R.G.S. Illustrated from photographs taken by the author. Pp. xvi + 348. (London: Hurst and Blackett, Ltd., 1901.) Price 12s. net.