Letters to the Editor.

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Spectrum of the Night Sky.

I HAVE now succeeded in obtaining a spectrogram showing the general features of the spectrum of the night sky in the south of England, with the moon below the horizon. The exposure given was about 50 hours, beginning each night not earlier than 2½ hours after sunset, and closing about midnight. There appears, therefore, to be no possibility that sunlight or moonlight intervened.

The spectrum shows the bright yellow-green aurora line very strongly. There is a continuous spectrum corresponding in distribution to the solar spectrum, and showing the dark Fraunhofer lines H and K. These are perfectly definite. The exposure is not enough to show the other Fraunhofer lines definitely, and, in any case, the instrument used is only capable of showing a few of the strongest of them.

There is no trace on this plate of the nitrogen bands, which form so conspicuous a part of the spectrum of the polar aurora. From some exposures I have made in the neighbourhood of Newcastle, three degrees farther north, I believe that the negative bands of nitrogen are a normal feature of the night-sky spectrum there. But more work is required on this point.

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Medical Education.

It is stated in NATURE (November 18, p. 683) that "The professional course has grown so full in the training of a medical student that it has become increasingly difficult to cover the ground and secure qualification in a reasonable time." It seems that chemistry and physics are to be placed outside the professional curriculum, but biology is to be retained. A knowledge of chemistry and physics is necessary to the doctor; and much of the recent advance in both medicine and surgery is due to discovery in these sciences. But can any one tell us of what utility, practical or intellectual, is the biology which medical students learn—facts about the classification of plants, the vascular system of the sea-urchin, the digestive system of the leech, the bones in the cod's head, and so on? No one is a better physician or surgeon for such knowledge; and, therefore, since it has no bearing on later study and practice, it is forgotten as soon as the prescribed examinations are passed.

For the medical man the intellectual value of biology should lie, if anywhere, in interpretation. It should cause him to think. He should learn man's place in Nature—how he resembles and differs from other living beings, and how these likenesses and differences arose. Man is in body and mind above all the educable, the trainable, the adaptive being. From birth forwards he develops mainly in response to use. He is rational and intellectual because his mind grows through functional activity. That is his special distinction; that places him in Nature. The medical student learns nothing of all this. He may be taught, incidentally as it were, that some characters are inborn, or acquired, or inheritable. But a year

or so later, physiologists and pathologists tell him the quite indisputable truth that every character takes origin in germinal potentiality (predisposition, diathesis), and arises in response to some sort of nurture—i.e. that every character is equally innate, acquired, and inheritable. If the student thinks at all, he must conclude, as Prof. Armstrong says very truly in another connexion (NATURE November 11, p. 648), "We are mouldering away in our laboratories and when we seek to make known what we have been doing we use a jargon which we cannot ourselves understand."

The medical student may be told that Natural Selection is an interesting speculation, but that no man has seen it in operation. Again, if he thinks, he will conclude that, owing to defective opportunities for observation, no man *could* see Natural Selection in operation among the wild animals and plants which biologists study. Nevertheless, a year or two later he will perceive it in full swing in the case of tuberculosis and every other lethal and prevalent human disease, and will learn that every human race is resistant to every human disease precisely in proportion to the length and severity of its past experience of that disease. There are scores of diseases and hundreds of races and sub-races of mankind; and, therefore, in some thousands of instances—whenever and wherever close observation is possible—he will find Natural Selection causing adaptive evolution. Moreover, he will learn that just as human races alter gradually in powers of resistance, so, at the other end of the scale, bacterial races alter in virulence when removed from one kind of animal to another, a thing quite inexplicable except on grounds of Natural Selection.

The student may be taught that effective selection occurs among mutations, not fluctuations. A year or so later he will perceive tuberculosis selecting amid all shades of difference, with the result that races present all shades of evolution. He may be taught that mutations segregate and that their inheritance is alternate. A year or so later he will learn that human mutations (e.g. idiocy, hare-lip, club-foot) are inherited, perhaps for many generations, in a patent or latent condition, and that only their reproduction is alternate. Moreover, he will wonder, if mutations segregate, how it happens that long-lost ancestral traits sometimes reappear in *purely bred* domesticated varieties (e.g. pigeon, poultry, and many plants). He may be taught that evolution depends on mutations and that mutations do not blend. A year or two later he will learn that human races never differentiate while there is inter-breeding, but diverge rapidly and infallibly when separated by time and space; that, though men are fond of telling about wonders, yet in the whole of written human history (4000 years or more) no useful human mutation has been recorded, nor one that changed the type of a race; that all human varieties (e.g. negro and white), like all natural varieties (e.g. brown and polar bear), blend perfectly when crossed in all characters except those linked with sex; and, lastly, that "lost" ancestral traits never reappear except when one of the parties to the cross is derived from a domesticated variety. If he thinks at all, he will conclude that Natural Selection is founded on fluctuations, but that man, as Darwin noted, "often begins his selection by some half-monstrous form, or at least by some modification prominent enough to catch the eye or to be plainly useful to him." He may be taught that the doctrine of recapitulation is doubtful. But if he thinks at all, he will perceive that any other mode of evolution and development is totally inconceivable. And so on.

The point I wish to emphasise is that medical men, with an acquaintance with man infinitely more