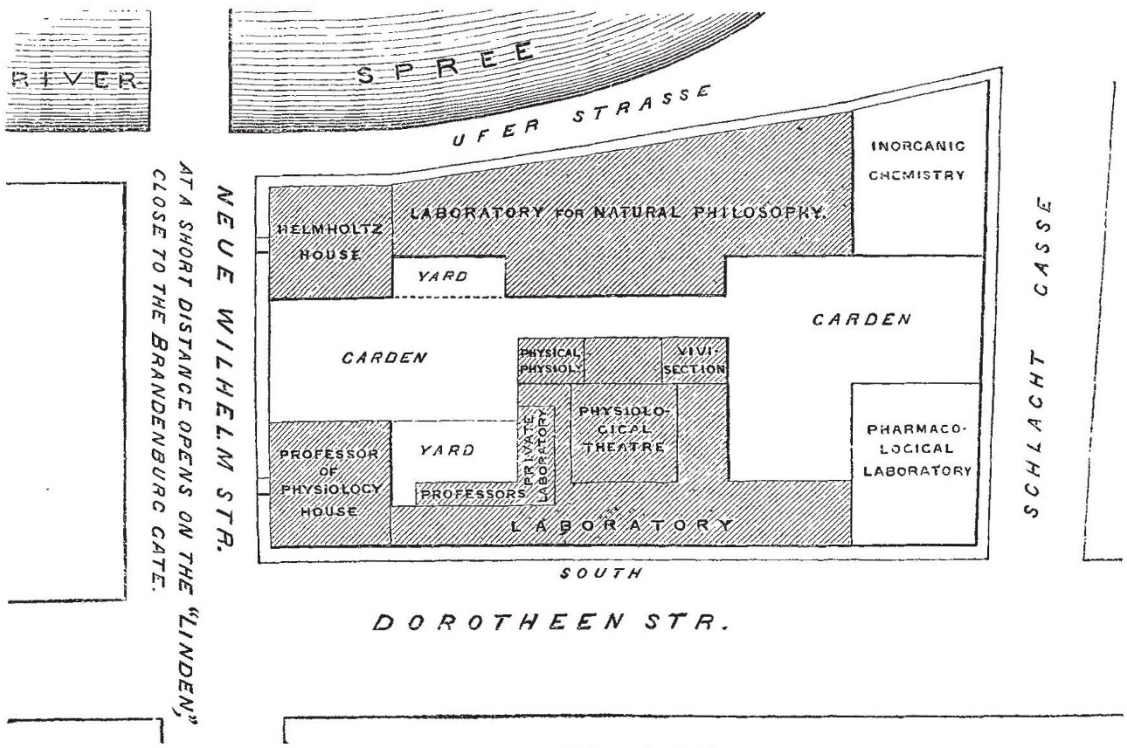
trict has been recently visited by Messrs. Bristow, Topley, and Drew, and it has been decided to sub-divide the strata hitherto known as the Ashburnham beds into two divisions.

The upper portion, consisting of the mottled clays and shales, will henceforth be called the Fairlight beds, while the lower portion, consisting of shelly limestone intermixed with calcareous shale and *gypsum*, will retain their old title; unless (as is confidently anticipated) they will be found to represent the Purbeck strata, in which case they will be known as the Sussex Purbecks. In reference to our own immediate object, this recent survey has established beyond doubt that the site of the boring is by far the best that the county of Sussex presents for the purpose.

Quite unexpectedly, on January 28, at a depth of 131 feet, a stratified mass of pure white crystalline gypsum (statuary alabaster) was reached. This proved to be over 4 feet in thickness; it was succeeded by 10 feet of gypseous marl; then by 3 feet more of alabaster. Afterwards, we passed through 15 feet of gypsum (more or less impure) varied by seams of crystals of selenite. This discovery has been most opportune. No such accumulation of gypsum was ever met with in Sussex before; and it is some consolation to know that our labour has not been all labour in vain: gypsum is a material which is commercially valuable.

Geologists may therefore inquire, "Where are we now?" The reply is given with caution, and under correction (as the shale seems singularly free from fossils), but as blocks of gypsum are found in the lower strata of the Purbeck series, we assume we are near the base of that formation, and may with some reasonable confidence expect to be able to announce before another quarter is over that we are through these problematical beds, and into the Portland series or some subjacent formation.



Plan of Physiological Laboratories, Berlin

The question of Finance begins to excite some anxiety in the mind of the treasurer. The amount required for machinery, sheddings, &c., has more than doubled the original estimate. Coals, tools, and labour, are each dear, and likely to remain so. The difficulty of access will greatly add to the original estimate of expenses. A large portion of our promised aid is given on conditions which render it unavailable at present.

If 200*l.* could be raised shortly, it would enable the Finance Committee to authorise the call of the second 1,000*l.*; and till this is done we are approaching insolvency. If each existing subscriber would kindly undertake to bring the matter under the notice of some neighbour or friend, we should not only soon raise all we want at present, but be relieved from anxiety for the ultimate prosecution of the enterprise.

We have nothing to do with the commercial value of our present or future discoveries; this will be freely given to those who can utilise it. We can only ask for aid from those who will "give, hoping for nothing again,' except scientific discovery.

THE NEW PHYSIOLOGICAL LABORATORIES AT BERLIN *

THE building of the new laboratory will begin on April 1. The plans are almost ready, and a most glorious place it will be, undoubtedly the finest physiological laboratory as well as the largest which was ever dreamt of. Besides the large theatre, and every possible accommodation for the lectures, it will contain rooms for collections, for a library, a smaller class-room, apartments for three assistants, lodgings for the servant and his family, &c. Then, there are five distinct laboratories most scientifically connected; (1) for physiological chemistry; (2) for physical physiology; (3) for vivisections; (4) for

* Extract from a letter communicated to us by Dr. Bence Jones.

microscopical and embryological investigations. To this laboratory is added a complete aquarium, in which it is hoped to be able to keep all sorts of marine and fresh-water creatures. (5) The private laboratory is organised so as to afford opportunities for every kind of physiological inquiry, so that future professors will feel at home in it, whatever may be their peculiar branch of physiological research. Then, of course, there are dark

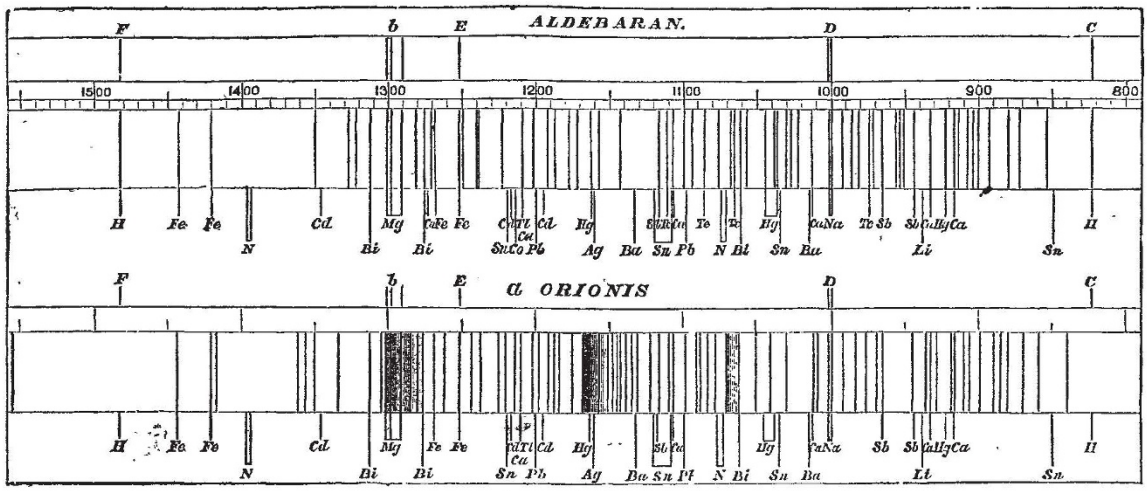


FIG. 34.—Spectra of Aldebaran and α Orionis. (Huggins and Miller.)

chambers looking to the south for optical experiments, rooms for a respiration apparatus, and all sorts of stables, an aviary, a ranarium for the summer, and one for the winter, &c. There is to be a dwelling-house close by, in fact so connected with the laboratory that from the study a lobby and a flight of stairs lead to the private laboratory. The House has been designed entirely according to the English fashion, and wonderful to say, hitherto has not yet met with serious opposition from the architects and the authorities. On the same premises there will be (1) Helmholtz's laboratory and dwelling-house; (2) a laboratory for inorganic chemistry; (3) one for pharmacology, under Leibreich. The accompanying sketch will give an idea of the whole. It covers an area of $4\frac{1}{2}$ acres. The style of building is to be magnificent, much more so than

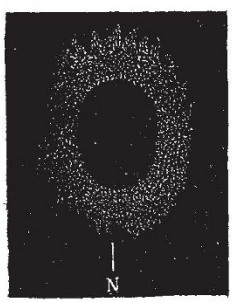


FIG. 35.

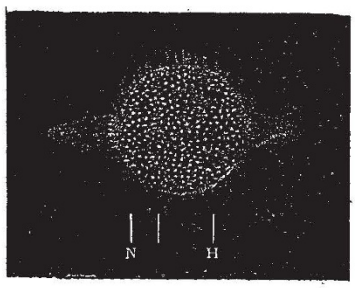


FIG. 36.

Fig 35.—Ring Nebula in Lyra, with its spectrum. Fig. 36.—Planetary Nebula in Aquarius, with its spectrum.

is desirable, because the costliness of the establishment increases the responsibility; but now that they are at it, they do not care for ever so many hundred thousands of dollars. All around the buildings, there will be an area, after the English plan, in order to mitigate the tremor occasioned by vehicles. In the Neue Wilhelmstrasse and the hitherto very nasty lane called Schlachtgasse there remains an open space facing the streets, so that the gardens intervening between the two great masses of building get as much light and air as is possible in the town. After all we are not so exclusively military as it may seem at a distance, and some of the French millions find their way into a scientific channel.

ON THE SPECTROSCOPE AND ITS APPLICATIONS

VI.

IN the first place, then, what does the spectroscope tell us with regard to the radiation from the sun and the stars? And here I ask you to neglect and banish from your minds for a time any idea of those dark lines in the solar spectrum that I drew your attention to on a former occasion. I hope I shall be able to explain them satisfactorily to you afterwards, but for the present I wish you merely to take the fact that our sun, but for the dark lines, would give us a continuous spectrum. The spectrum of the stars is very much like the spectrum of the sun. In Fig. 34 is seen a representation of the spectra of two stars, α Orionis and Aldebaran, mapped with the minutest care by Dr. Miller and Mr. Huggins.

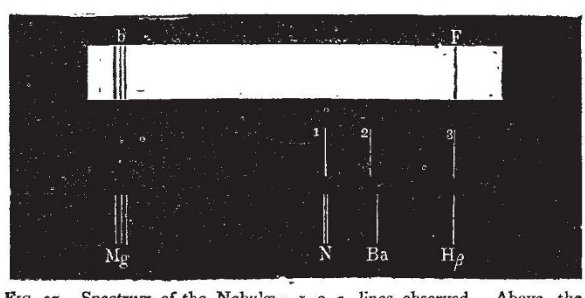


FIG. 37.—Spectrum of the Nebulæ.—1, 2, 3, lines observed. Above, the solar spectrum is shown from *b* to *v*; below, the bright lines of magnesium, nitrogen, barium, and hydrogen, in the corresponding part of the spectrum.

In both cases we should have a continuous spectrum but for the presence of the dark lines. I think you will see in a moment what I am driving at. Suppose the sun or stars composed of only sodium vapour, for instance, it is clear that their light analysed by the prism would give us no great indication of a continuous spectrum, we should merely get one bright line in the orange. But neglect the dark lines for a moment: dealing merely with the continuous spectrum of the sun and star, it shows that we have a something, whether it be solid or liquid, or whether it be a dense gas or a vapour, competent to give us a continuous spectrum. So we are justified in assuming that sunlight and starlight proceed from the incandescence of