

which had been shown to me by M. Dubosque Solcil, and the Abbé Moigno, in Paris, in the month of October, 1850. A prism and lenses were arranged to throw upon a screen an approximately pure spectrum of a vertical electric arc between charcoal poles of a powerful battery, the lower one of which was hollowed like a cup. When pieces of copper and pieces of zinc were separately thrown into the cup, the spectrum exhibited, in perfectly definite positions, magnificent well-marked bands of different colours characteristic of the two metals. When a piece of brass, compounded of copper and zinc, was put into the cup, the spectrum showed all the bands, each precisely in the place in which it had been seen when one metal or the other had been used separately.

It is much to be regretted that this great generalization was not published to the world twenty years ago. I say this, not because it is to be regretted that Angström should have the credit of having, in 1853, published independently the statement that "an incandescent gas emits luminous rays of the same refrangibility as those which it can absorb"; or that Balfour Stewart should have been unassisted by it when, coming to the subject from a very different point of view, he made, in his extension of the 'Theory of Exchanges,' (*Edin. Transactions*, 1858-59,) the still wider generalization that the radiating power of every kind of substance is equal to its absorbing power for every kind of ray; or that Kirchhoff also should have, in 1859, independently discovered the same proposition, and shown its application to solar and stellar chemistry; but because we might now be in possession of the inconceivable riches of astronomical results which we expect from the next ten years' investigation by spectrum analysis, had Stokes given his theory to the world when it first occurred to him.

## 2. SOLAR AND STELLAR CHEMISTRY.

To Kirchhoff belongs, I believe, solely the great credit of having first actually sought for and found other metals than sodium in the sun by the method of spectrum analysis. His publication of October, 1859, inaugurated the practice of solar and stellar chemistry, and gave spectrum analysis an impulse to which in a great measure is due its splendidly successful cultivation by the labours of many able investigators within the last ten years.

To prodigious and wearing toil of Kirchhoff himself, and of Angström, we owe large-scale maps of the solar spectrum, incom-