

Astronomy

Partial Impact.

(To the Editor PROGRESS.)

Dear Sir,—I must thank Professor Bickerton for his additional explanations of the various phenomena observed in the spectra of new stars. I readily admit that his theory explains most of these phenomena very well, and he certainly deserves great credit for originating so ingenious a theory long before the spectra of new stars had been photographed, and almost as soon as they had been visually observed. I shall be very pleased if he succeeds in establishing his theory completely, and in convincing scientists of its truth. When that day comes I hope to be one of the first to congratulate him. In the meantime, if I take the liberty of pointing out what appear to

sents the visual spectrum of Nova Aurigae as observed at the Lick Observatory on Feb. 28th, 1892, by W. W. Campbell. The principal bright bands which have been identified are the following, beginning with the broad bands to the right at H. :—

Bright band at II, wave-length, 4341, hydrogen.

Bright band to right of 460, wave-length 4583, iron.

Bright band to left of 460, wave-length 4629, iron, titanium.

Bright band at F, wave-length 4862, hydrogen.

Broad band between F and 500, wave-length 4923, iron, helium.

Broad band to left of 500, wave-length 5014, iron, helium.

Bright band at b, wave-length 5168, iron, magnesium

Bright band at D, wave-length 5896, sodium.

Bright band at C, wave-length 6563, hydrogen.

Bright band at 680, helium (?)

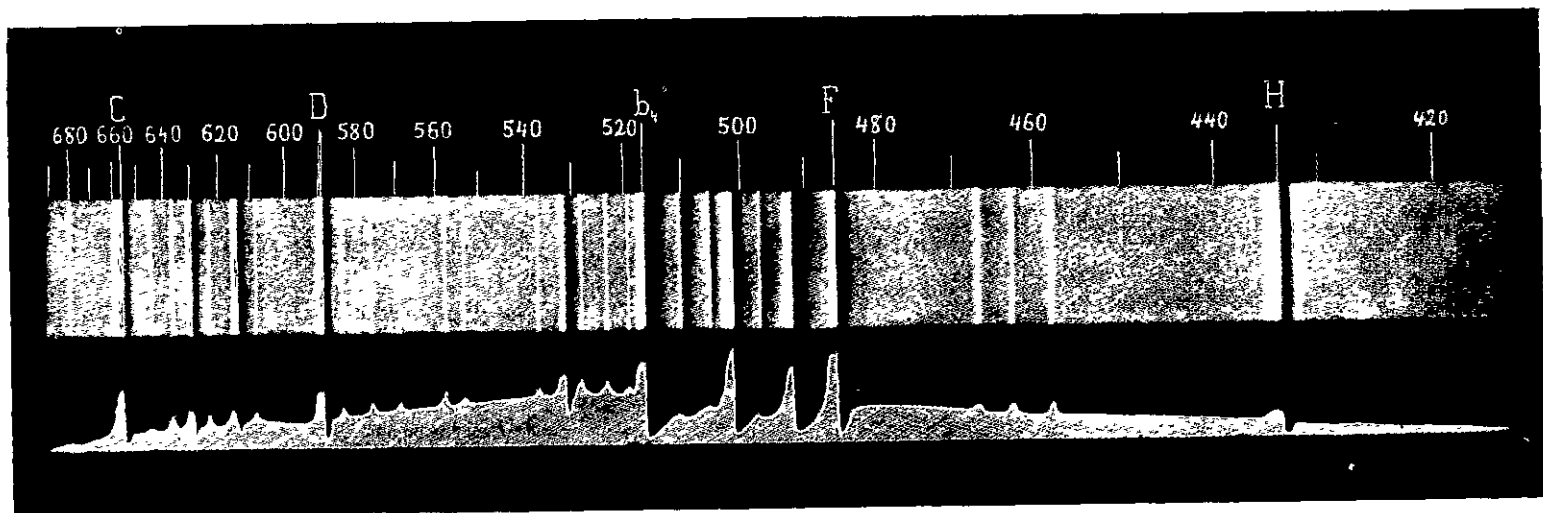
The above particulars are taken from Scheiner's *Astronomical Spectroscopy*, p. 286. No measurements of the bands are given, but a mere glance suffices to show

band at D. Again, the hydrogen band at F is scarcely broader than the iron band of wave-length 4583, to the right of 460; yet if the theory was true, it ought to be more than 7 times broader, since the atomic weight of iron is 55.9. Even the broadest hydrogen band at H is not more than 3 times as broad as the iron band.

No comparison can be made between the hydrogen and helium bands in this spectrum, as the only distinct helium band is a doubtful one at wave-length 680. The other helium bands appear in conjunction with iron bands, and it is impossible to determine what width of the band belongs to each of the two elements. But the comparison of the hydrogen, iron and sodium bands is quite sufficient to show that Professor Bickerton's explanation of their different widths can no longer be maintained. I am writing to astronomers in England and America who have made a special study of the spectra of new stars, in order to obtain the identification of the bands in the spectrum of Nova Persei, with a view to a similar comparison between the bands of the various elements.—Yours, etc.

D. KENNEDY.

Meance, Sept. 9, 1908.



SPECTRUM "NOVA AURIGAE," 1892.

me to be flaws in his theory, it is only with a view to obtain fuller explanation and clearer proof.

There is one serious defect in his theory, which Professor Bickerton himself practically admits: it does not explain the difference in the breadth of the bright bands in the spectrum of a new star. It is true he maintains that the difference is due to the different speeds of the expanding atoms, the width of the bands being inversely proportional to the square root of the atomic weight of the element producing the band. Thus, he says, the hydrogen bands are twice as broad as the helium bands, four times as broad as the oxygen bands, and so on. But he now acknowledges that he is unable to prove this, for he frankly admits that he does not know to what elements the bands belong. This is certainly a serious admission after having boldly asserted that his explanation of the phenomenon was "delightfully simple and clear." His explanation turns out to be an unwarranted assumption without evidence or proof of any kind. Not only is there no evidence to support his explanation of the different widths of the bands, but there is positive proof that his explanation is wrong, as I will now show.

I would ask Professor Bickerton to examine carefully the accompanying picture of the spectrum of a new star. It repre-

sents the spectrum of Nova Aurigae, 1892. In the first place, it will be noticed that the three hydrogen bands at C, F, and H, are not of equal breadth, H being broader than C, and C broader than F. Yet, according to the theory, they should be equal, since the breadth of the bands is supposed to vary with the atomic weight. In the second place, it is easy to see that the hydrogen band at F is not broader than the sodium

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band at D, yet, according to the theory, it should be 4.8 times as wide, since the atomic weight of sodium is 23, and the breadth of the bands is supposed to be inversely proportional to the square root of the atomic weights. Even the broadest hydrogen band at H is not 4.8 times as wide as the sodium

(Correspondence.)

The New Electric Gun. No Recoil.

(The Editor, PROGRESS.)

Dear Sir,—I have noticed in the August 1st, 1908, edition of PROGRESS, at page 337, a description of a new electric gun. The inventor claims an enormous muzzle velocity for the projectile, and says, "there is no recoil!" On the same page Colonel Maude, R.A., speaks of "The fact that the weapon can confer a velocity of 30,000 feet per second without recoil." At page 338 Col. Maude is said to have used these strange words: "Mr. Simpson (the inventor) has not tampered with the Newtonian laws of motion." We must be sceptical of the inventor's ability to tamper with those laws. Most of your readers having mechanical knowledge, do not trouble to criticise the assertion of no recoil, they understand re-action, and let it go at that. One of Newton's laws says: "To every action there must be an equal and contrary re-action," therefore the foot-pounds of work done by the explosive will be equal in opposite directions. Suppose you fired the gun with the breech open, then the impulsive or explosive force would expend itself upon the air behind, and air, being lighter and more elastic than the projectile, the explosive would have very little apparent effect upon the latter. Now with the breech open, consider the gun reversed. Under that condition the inventor would be firing air, and he would probably claim that there was no recoil of the projectile that would then obviously represent the gun breech. In the trial that has been made firing a 5lb. shot from a gun 16ft. long, the gun was probably much heavier than the shot, and therefore the recoil was not noticed. Yours faithfully,

JAMES E. FULTON, M.Inst.C.E.