the mountain. Of these the more important were the general climatology of Mount Rose, the relation of climate to the plant environment, the relation of timber to the conservation of snow, and the frost forecasting from the summit. With such a record for its short life, and with ambitious plans for the future, progress is certain to be the result. Having recently been assured of further support by the office of experiment stations of the national government, the zealous workers are almost certain to produce results which will be of great value to meteorology in general and to the agricultural interests of the Great Basin in particular.

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CONCERNING THE DATE OF THE LAMARCK MANUSCRIPT AT HARVARD

A curious mistake has found its way into M. Landrieu's "Life of Lamarck" regarding the probable date of the Harvard manuscript to which I referred in the March number of the *American Naturalist*. In this article I had stated that the "Manuscrits de Lamarck" were "*brought together* in a volume, the binding dating 1830–40," and that in this little volume there was "a table of contents, probably in the hand of the *early owner* [this does not mean the *author*] of the manuscript." Also that "it will be noted that the papers were *collected* before 1835, the year of the appearance of the second edition of the 'Animaux sans Vertèbres,'" because in the table of contents, referred to above as "in the hand of the early owner" "it is stated that the drawings *will form* part of the second edition" of that work.

Now M. Landrieu remarks in perfect seriousness that I have given the probable date of the *writing* of the manuscript "as before 1835," at which time, as he notes, "Lamarck had been dead six years, after ten years of total blindness!" So I must now smilingly protest that I was aware of the date of Lamarck's death, and even when his eyesight failed him—in fact I mentioned the latter date, as 1818, in the same *Naturalist* paper (p. 148) which my colleague has so imperfectly read. The year 1835 is but a landmark in the Harvard manuscript, since it was at that time or somewhat before that time that its five component parts were brought together in a little volume by the "early owner," who may well have been an editor of the second edition of the "Animaux sans Vertèbres." If, moreover, my good friend M. Landrieu had interpreted the *Naturalist* paper carefully, he might have discovered that I have given the probable dates of various parts of the Harvard manuscript as prior to 1818, "the year in which Lamarck's eyes failed him." So, after all, M. Landrieu's estimate of the date of these manuscripts and my own do not differ widely. He gives the dates between 1810 and 1820—thus he is even less conservative than myself, for he assumes that Lamarck may have continued to write his papers *propria manu* even after his eyesight failed.

Bashford Dean

SPECIAL ARTICLES

THE INTERFERENCE OF THE REFLECTED DIFFRACTED AND THE DIFFRACTED REFLECTED RAYS OF A PLANE TRANSPARENT GRATING, AND ON AN INTERFEROMETER

If parallel light, falling on the front face of a transparent plane grating, is observed through a telescope after reflection from a rear parallel face the spectrum is frequently found to be intersected by strong vertical interference bands. Almost any type of grating will suffice, including the admirable replicas now available, like those of Mr. Ives. In the latter case one would be inclined to refer the phenomenon to the film and give it no further consideration. On closer inspection, however, it appears that the strongest fringes certainly have a different origin and depend essentially on the reflecting face behind the grating. If, for instance, this face is blurred by attaching a piece of rough wet paper, or by pasting the face of a prism upon it with water, so as to remove most of the reflected light, the fringes all but disappear. If a metal mirror is forced against the rear glass face whereby a half wave-length is lost at the mirror but not at the glass face in contact, the fringes are impaired, making a rather interesting experiment. With homogeneous light the fringes of the film itself appear to the naked eye, as they are usually very large by comparison.

Granting that the fringes in question depend upon the reflecting surface behind the grating, they must move if the distance between them is varied. Consequently a phenomenon so easily produced and controlled is of much greater interest in relation to micrometric measurements than at first appears and we have for this reason given it detailed treatment. It has the great advantage of not needing monochromatic light, of being applicable for any wave-length whatever and of admitting of the measurement of small horizontal angles.

When the phenomenon as a whole is carefully studied it is found to be multiple in character. In each order of spectrum there are different groups of fringes of different angular sizes and usually in very different focal planes. Some of these are associated with parallel light, others with divergent or convergent light, so that a telescope is essential to bring out the successive groups in their entirety. At any deviation the diffracted light is necessarily monochromatic; but the fringes need not and rarely do appear in focus with the solar spectrum. If the slit of the spectroscope is purposely slightly inclined to the lines of the grating, certain of the fringes may appear inclined in one way and others in the opposite way, producing a cross pattern like a pantograph. The reason for this appears in the equations.

In any case the final evidence is given when the reflecting face behind the grating is movable parallel to it. The principal fringes of the interferometer so obtained are subject to the equation (air space e, wave-length λ, angle of incidence i, of diffraction θ'),

$$\delta e = \lambda/2(\cos\theta' - \cos i),$$

and it is therefore less unique as an absolute instrument than Michelson's classic apparatus or the device of Fabry and Perot. Its sensitiveness per fringe depends essentially upon the angle of incidence and diffraction and it admits of but 1 cm. (about) of air space between grating face and mirror before the fringes become too fine to be available. But on the other hand, it does not require monochromatic light (a Welsbach burner suffices), it does not require optical plate glass, it is sufficient to use but a square centimeter of grating film, and it admits of very easy manipulation, for painstaking adjustments as to normality, etc., are superfluous. In fact, all that is needed is to put the sodium lines in the spectrum reflected from the grating and from the mirror into coincidence both horizontally and vertically with the usual three adjustment screws on grating and mirror. Naturally sunlight is here desirable. Thereupon the fringes will usually appear and may be sharply adjusted on a second trial at once.

When the air space is small, coarse and fine fringes (fluted fringes) are simultaneously in focus, one of which may be used as a coarse adjustment on the other. Finally the sensitiveness per fringe to be obtained is easily a length of one half wave-length in the fine fringes and one wave-length in the coarse fringes, though the latter may also be increased almost to the limit of the former.

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THE EFFECT OF ASPHYXIA ON THE PUPIL[1]

IN a recent communication to the Society for Experimental Biology and Medicine (p. 49, December 16, 1908) Dr. John Auer stated that the "Myotic effect of asphyxia in frogs is interesting, as asphyxia in mammals produces chiefly dilatation." We were surprised at this statement, as we had a different impression from having observed the pupils of various animals during asphyxia. As such observations are usually recorded we examined our protocols, and finding our impression con-

[1] From the physiological laboratories of Washington and Pittsburgh universities.