Publications of the

radiant in Aquarius was secured from six meteors. Observations on May 13th again failed to supply more than one or possibly two Aquarids. None were seen May 18th, though carefully looked for.

The parabolic elements for May 4th and May 11th were calculated and are tabulated below, with the corresponding elements for Comet Halley:

<table>
<thead>
<tr>
<th>G.M.T.</th>
<th>α</th>
<th>δ</th>
<th>i</th>
<th>q</th>
<th>Ω</th>
<th>π</th>
<th>πΩ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comet Halley,</td>
<td>163° 12'</td>
<td>57° 16'</td>
<td>168° 58'</td>
<td>111° 42'</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aquarids, May 4.97</td>
<td>334°.0</td>
<td>-3°.4</td>
<td>164 15</td>
<td>0.6770</td>
<td>156 6</td>
<td>112 2</td>
<td></td>
</tr>
<tr>
<td>Aquarids, &quot; 11.99</td>
<td>342°.0</td>
<td>-0°.6</td>
<td>166 41</td>
<td>0.6297</td>
<td>155 7</td>
<td>104 16</td>
<td></td>
</tr>
</tbody>
</table>

The close resemblance of the elements leaves no reasonable doubt that these meteors were intimately connected with the comet in time past and that they are now moving in nearly identical orbits.

It is a matter of interest to notice the decided eastward shift of the radiant between the two dates and also to mention that May 6th seems the latest date on which these meteors were ever before observed.

Chas. P. Olivier.

Classification of the Hydrogen (Ha) Flocculi.

The prime characteristic of the hydrozen flocculi, as photographed with the Ha line, is their tendency to assume regular and distinctive structural forms. While these forms vary widely in character, three principal types, designated provisionally unipolar, bipolar, and multipolar, may be recognized as follows:

Unipolar, usually surrounding single (or close double) sunspots, but sometimes found where no spot is present; the form resembles that of a simple vortex, either right-handed or left-handed.\(^1\)

Bipolar, usually associated with two spots of opposite polarity, which are in most cases at opposite ends of a spot-group. Sometimes one or both of the spots may be absent, or replaced by a bright flocculus. The flocculi closely resemble the lines of force uniting the north and south poles of a bar magnet. Many variations of this structure occur, usually in connection

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\(^1\) For examples of this type, see Nature, 82, 23, Fig. 4, November, 1909.
with the presence in the group of small spots or eruptive flocculi. This type is a very common one. In fact, the two spots at the opposite ends of a group are almost invariably found to be of opposite polarity, accompanied by $H\alpha$ flocculi showing this structure. Moreover, photographs of the flocculi made with the hydrogen lines $H\beta$, $H\gamma$ and $H\delta$ bring out the general features of the type (though less clearly than $H\alpha$), so that the resemblance to lines of force was detected in my earliest photographs of the hydrogen flocculi, made with $H\beta$ and $H\gamma$ in 1903. Even the $H_2$ and $K_2$ flocculi and the faculae in direct photographs, show a similar structure.

_Multipolar_, usually surrounding groups containing several spots, and sometimes persisting after the spots have disappeared. The disturbed area, frequently of enormous extent, is roughly elliptical in form, with long, curved flocculi, of peculiar structure, directed toward the interior. Generally the major axis of the ellipse is nearly parallel to the long axis of the spot group. An excellent example may be found in my paper on "Solar Vortices." ¹

Sometimes the multipolar type is associated with, or hardly distinguishable from the bipolar, and both multipolar and bipolar flocculi have been found with flocculi of the unipolar type. In spite of this fact, and the obvious necessity of providing for subdivisions of the above types, the distinction between the unipolar, bipolar, and multipolar forms will be readily recognized in examining a long series of good photographs of the Sun made with $H\alpha$.

In addition to the above types, the dark filaments and the bright eruptions must of course find a place in a general classification of the hydrogen flocculi.

GEORGE E. HALE.

A RADIAL VELOCITY OF COMET a 1910.

It is only very rarely that an accurate radial velocity of a comet can be obtained by means of the spectrograph, for two reasons: few comets are sufficiently bright to permit the use of high dispersion, and there must be present in the comet spectrum lines whose wave-lengths are accurately known.

¹ Astrophysical Journal, 28, Plate VI, September, 1908.