it and the negative carbon was about 15 volts and between it and the positive carbon about 40 volts. The introduction of Ca or K into the negative carbon did not change the voltage between it and the third carbon. When the salt was introduced into the positive pole the voltage between the positive pole and the third carbon fell to 25 volts, but the voltage between the negative and third carbons remained 15. It appears that the current passes from pole to pole, in part, at least, as a convective discharge of charged particles.

Note on Charles Smith's Definition of Multiplication. By Robert J. Aley.

"To multiply one number by a second is to do to the first what is done to unity to obtain the second."

This definition covers the multiplication of positive and negative integers, fractions and imaginary numbers. Accepting it as true, the law of signs follows as a result. We can easily show that it includes the multiplication of imaginaries. Suppose we are to multiply a by $b\,i$. We are to do to a what is done to unity to obtain $b\,i$. To obtain $b\,i$ from unity we take unity b times and turn it counter clock-wise through an angle of 90 degrees. By performing this operation upon a we obtain $ab\,i$. Suppose we are to multiply $a\,i$ by $b\,i$. By the same process as above we readily see that the result is $-ab$. This shows that the definition includes practically all of Quaternion multiplication.

If we undertake to apply it to the multiplication of b by a^2 we encounter our first difficulty. a^2 has been obtained from unity by taking unity a times and squaring. If we do this to b we obtain $a^2\,b^2$, a result manifestly wrong. If, however, we remember that $a=a\,a$ and is obtained from unity by taking it $a\,a$ times, our difficulty disappears and we obtain the correct result $a^2\,b$. If we undertake to multiply b by $a^{1/2}$ we find a difficulty which seems to be insurmountable. The only way we can obtain $a^{1/2}$ from unity is by taking unity a times and extracting the square root. If we do this to b we obtain the incorrect product $a^{1/2}\,b^{1/2}$. The definition seems to fail utterly when applied to irrationals. Perhaps, after all, it is better to follow the custom of most algebras and make only symbolic definitions.

Indiana University, December 8, 1897.