26th. March, 1930.

A.M. Buchanan Smith, Esq., M.A.,
   Animal Breeding Res. Dept.
      King's Buildings,
        West Mains Road,
          EDINBURGH.

Dear Buchanan Smith,

The formulae you want are two of those given in my letter of December 20th.

(ii) Sum of pq values of $(x_p - y_q)^2$

$$= pq(\bar{x} - \bar{y})^2 + p\overset{q}{\underset{1}{S}}(y - \bar{y})^2 + q\overset{p}{\underset{1}{S}}(x - \bar{x})^2.$$

(iii) Sum of $\frac{1}{2}p(p-1)$ squares of differences within a single group of p values is

$$p\overset{p}{\underset{1}{S}}(x - \bar{x})^2.$$

I do not think a negative correlation is theoretically possible, because all the correlations are intraclass. The new data for unrelated pairs may have given a better absolute value, but not a better one in relation to the other groups; alternatively your group of Sire - Paternal $\frac{1}{2}$ brother, Dams - not sisters, is not big enough.

                    Yours sincerely,