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COMPLEMENT FIXATION REACTION OF FOOT AND MOUTH DISEASE. II.

THE DEPENDENCE BETWEEN IMMUNE SERUM AND COMPLEMENT AND BETWEEN ANTIGEN AND COMPLEMENT

By

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In the present article on the complement fixation reaction of foot and mouth disease, the dependence between immune serum and complement and between antigen and complement is subjected to a close investigation.

The procedure mentioned in a recently published work (*Schjerning-Thiesen* (9)), is employed in a determination of the complement units which are fixed by different amounts of immune serum plus optimum amount of antigen, and antigen plus optimum amount of immune serum respectively.

RESULTS

The curve in fig. 1 and 2 show a clearly rectilinear course (linear relation). In fig. 1 where the curve passes through the zero of the co-ordinate system, direct proportionality exists between immune serum and complement, from which follows that in this case it is possible — from the knowledge of a number of specifically fixed complement units — by the rule of three to compute the complement units that are consumed by any amount of immune serum. In fig. 2 where the curve does not pass through zero, but intersects the abscissa very near zero, the strength of any amount of immune serum can only approximately be determined in the said way. However, proportionality exists between numbers of specifically fixed complement units and immune

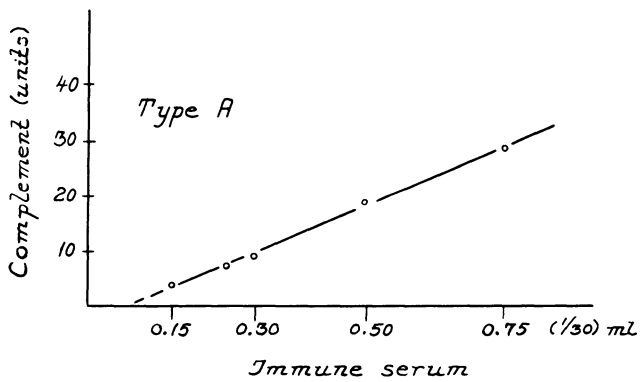
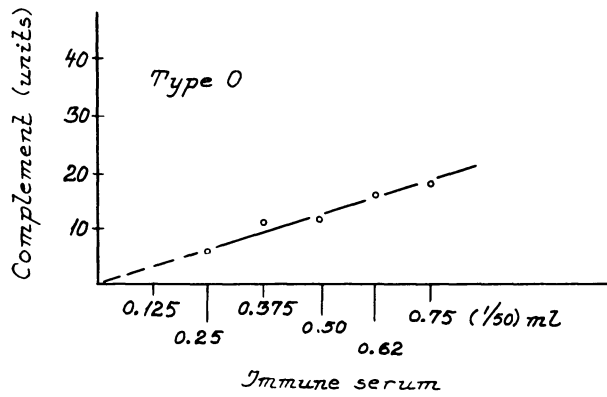


Fig. 1 and 2: Complement units fixed by different amounts of immune serum plus optimum amount of antigen. The curves show a clearly rectilinear course.

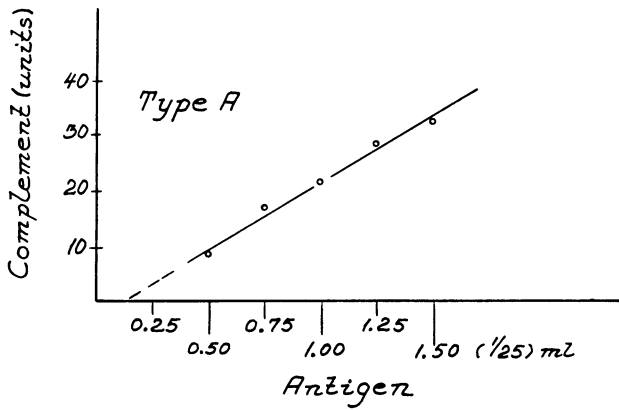
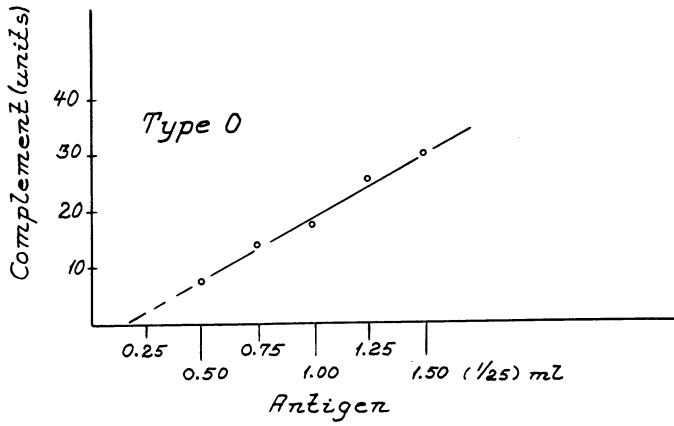


Fig. 3 and 4: Complement units fixed by different amounts of antigen plus optimum amount of immune serum. The curves show a clearly rectilinear course.

serum minus a quantity corresponding to the piece that the curve intersects on the X-axis. The fact that the curve intersects the abscissa is an expression that amounts of immune serum below a certain quantity (0.07 ml) do not fix complement, or, more probable, do not fix measurable quantities of complement, or it may be an expression that the curve in its initial stage has a non-linear course. This circumstance, however, is immaterial to the carrying out of computations which concern the linear part.

The curve in fig. 3 and 4, too, show a clearly rectilinear course, that is to say that there is also a linear relation between the components of antigen and complement.

The fact that all curves show a clearly rectilinear course is an expression of the sufficiency and effect of the applied technique, and hereby also of the importance of the employment of optimum amounts.

From the scientific literature it appears that linear relation as mentioned here has been observed in the work with syphilis (*Wadsworth et al.* (11 and 12)), tuberculosis (*Wadsworth et al.* (10)), pneumonia caused by cocci (*Rice* (4)), influenza (*Rice* (6)), and also with vaccine virus (*Rice* (5)). With syphilis *Bier et al.* (2) get a rectilinear course with immunizing serum and complement by working with the logarithm of the immune serum amount. With syphilis *de Almeida et al.* (1) do not get a linear relation between immune serum and complement until they work in such a manner that after the fixation with each immune serum amount the same number of free complement units are left. With different viral and rickettsial systems *Rice* (7) has found an approximately linear relation between immune serum and complement. *Rice & Brooksby* (8) announce that with foot and mouth disease they have found similar circumstances as with previously studied viral antigen-antibody systems. With stomatitis vesicularis *Rice & McKercher* (9) also found an approximately linear relation.

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SUMMARY

The dependence between immune serum and complement and between antigen and complement in the complement fixation reaction of foot and mouth disease is investigated. It is demonstrated that in foot and mouth disease as in several other diseases a linear relation exists between these components. This fact is of importance where the complement fixation relation is wanted to be applied with the greatest possible accuracy (type differentiations, antigen titrations).

ZUSAMMENFASSUNG

Die Komplementbindungsreaktion bei Maul- und Klauenseuche. II. Das Abhängigkeitsverhältnis zwischen Immuns Serum und Komplement und zwischen Antigen und Komplement.

Das Abhängigkeitsverhältnis zwischen Immuns Serum und Komplement sowie zwischen Antigen und Komplement in der Komplementbindungsreaktion bei Maul- und Klauenseuche wird untersucht. Es wird festgestellt, dass bei Maul- und Klauenseuche ebenso wie bei mehreren anderen Krankheiten eine lineare Relation zwischen diesen Komponenten besteht. Dieses Verhältnis ist von Bedeutung, wenn es sich darum handelt, dass die Komplementbindungsreaktion mit der grösstmöglichen Genauigkeit ausgeführt wird (für Typendifferenzierungen, Antigentitrungen).

SAMMENDRAG

Komplementbindungsreaktionen ved mund- og klovesyge. II. Afhængighedsforholdet mellem immuns serum og komplement og mellem antigen og komplement.

Afhængighedsforholdet mellem immuns serum og komplement samt mellem antigen og komplement i komplementbindungsreaktionen ved mund- og klovesyge undersøges. Det konstateres, at der ved mund- og klovesyge ligesom ved flere andre sygdomme findes en lineær relation mellem disse komponenter. Forholdet er af betydning, hvor komplementbindungsreaktionen ønskes anvendt med størst mulig nøjagtighed (typedifferentieringer, antigentitreringer).

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