bzw. *l*-Peptidase; Wachstumssteigerung durch *R/L*-Atebrin bzw. *R/L*-Arginin) keinen Bezug.

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Summary

Bacillus mycoides Flügge is found growing both as counter-clockwise (probably wild form) and as clockwise colonies (probably selected mutant stocks). One spontaneous mutation of $R \rightarrow L$ and of $L \rightarrow R$ has been observed respectively. Even after only a solitary culturing on agar containing optically active substances, the direction of rotation could be inverted temporarily or as *Dauermodifikation* up to 100 p.c. Upon this the *R*- and *L*-stocks exhibited significant differences: the former ones obviously respond to naturally occuring isomeres, the latter to "non-natural" isomeres only.

Complex Structure of the Bacterial Capsule in the Genus Bacillus

The capsules of most bacteria are composed of gum-like polysaccharides. On the contrary the capsule of *Bacillus anthracis* consists of a polypeptide made up of *d*(-)glutamic acid[1]. The bacterial capsule is thus regarded as being composed either of polysaccharides *or* of polypeptide, whereas a composite structure has been unknown.

By studying the serological behaviour of the capsule of sporeforming aerobic bacilli an unexpected complex structure was found, as reported here briefly.

These observations were made by mixing the different living capsulated bacilli with their homologous antisera as well as with an anti-Anthrax polypeptide serum, and then examining the preparations with the phase contrast microscope. A composite structure of the capsule has been observed thus far in two members of the genus Bacillus; these are the following: (1) four authentic strains of *Bacillus megatherium*, (2) an anthrax-like non-pathogenic bacillus, isolated in a former study[2] concerning the induced mutation of *Bacillus anthracis*, designated here as *Bacillus M*. *Bacillus M* cannot be distinguished morphologically from *Bacillus anthracis* or from *Bacillus cereus*, but its metabolism is different. It cannot be classified under the well defined mesophilic bacilli listed in the 6th edition of BERGEY's Manual. Glucose is fermented extremely slowly, arabinose not at all. Starch is not hydrolyzed and acetylmethylcarbinol is not produced. Gelatin is hydrolized and nitrites are produced from nitrates. In broth it shows a slight motility and on agar medium, rich in amino acids, it has grown during the last two years invariably in capsulated form. Spores are produced only in potato extracts. These are cylindrical, rather central. The sporangia are not bulged.

Since the complex structure of the capsule was essentially the same in the case of *Bacillus megatherium* and of *Bacillus M*, the latter shall be described in this communication.

[1] J. TOMCSIK and H. SZONGOTT, Z. Immunforsch. *77*, 86 (1932). —G. BODON and J. TOMCSIK, J. Proc. Soc. Exp. Biol. Med. *32*, 122 (1934).—G. IVANOVICS and V. BRUCKNER, Z. Immunforsch. *90*, 304 (1937); *91*, 175 (1937).

[2] J. TOMCSIK, Schweiz. Z. Path. Bakt. *12*, 489 (1949); *13*, 616 (1950).

Bacillus M was agglutinated by 1:40 dilution of anti-anthrax polypeptide serum. When undiluted, this serum produced an instantaneous, homogeneous capsular reaction (Fig. 1). The capsular reaction was usually so intense that the details of the cell-structure were hardly visible. Nevertheless it could be assumed that the narrow white strip between the bacillary body and the capsule corresponds to the cell wall, which does not take part in the reaction.

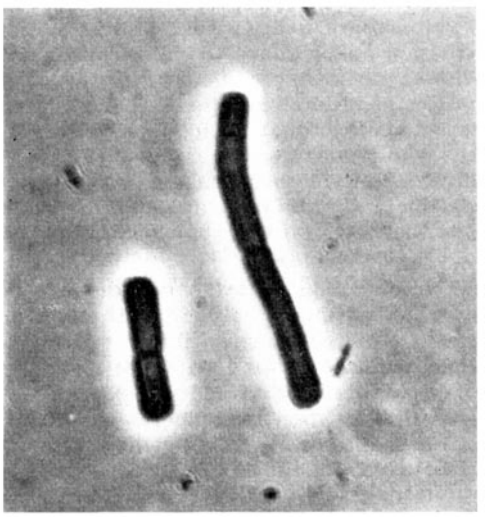

Fig. 1.—With polypeptide antibody. Capsular Reactions with *Bacillus M*.

The homologous antibody of *Bacillus M* agglutinated this bacillus in a dilution of 1:640, but gave no agglutination with *Bacillus anthracis* or *Bacillus megatherium* in 1:5 dilution. When it was mixed undiluted with an encapsulated anthrax suspension, a faint capsular reaction could be detected indicating the presence of a very small amount of polypeptide antibody. The reaction of *Bacillus M* with its homologous antibody gave a surprising picture (Fig. 2). The capsule appeared invariably as a striated structure suggesting a capsular framework consisting of a substance other than polypeptide, as will be pointed out below. It is more difficult

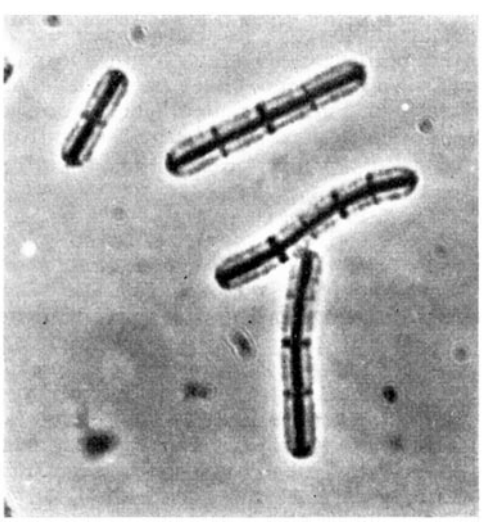

Fig. 2.—With homologous antibody.

to interpret the appearance of the very distinct thick cross septa, which cut across the chain up to the edge of the capsule. They are occasionally thicker in the surface of the capsule than in the interior. A further condensation of the capsular material reacting with the homologous serum appears at the rounded ends of the chains.

KNAYSI first convincingly described the bacterial cell wall in his studies of *Bacillus subtilis* in preparations vitally stained with crystal violet[1]. As he showed a cross wall appeared in consecutive stages of cell division as a double line. We have also observed occasionally distinctly double cross septa, hence we can assume their relation to cell division and perhaps to the cell wall. It is surprising however that in phase contrast preparations the barely visible partition lines appear so distinctly following the specific effect of an antibody, and that these cut across the whole thickness of the capsule. This observation indicates that the bacterial capsule with its sharp boundary line and cross septa might belong more intimately to the bacterial cell than has been previously believed.

A possible objection that the two distinct types of capsular reactions might be elicited through different concentrations of the same antibody, was invalidated by the fact that the striated structure and cross septa were never produced by diluted polypeptide antibody. Furthermore, absorption experiments were carried out with both immune sera by mixing them with the same quantity of a 1:500 dilution of purified subtilis polypeptide, but it did not influence the capsular reaction elicited by the homologous serum.

Studies in progress indicate that the cross septa and the other peculiar cell structures appearing after the addition of the homologous antibody are composed of polysaccharides, and that the polypeptide homogeneously fills the free space between these structures.

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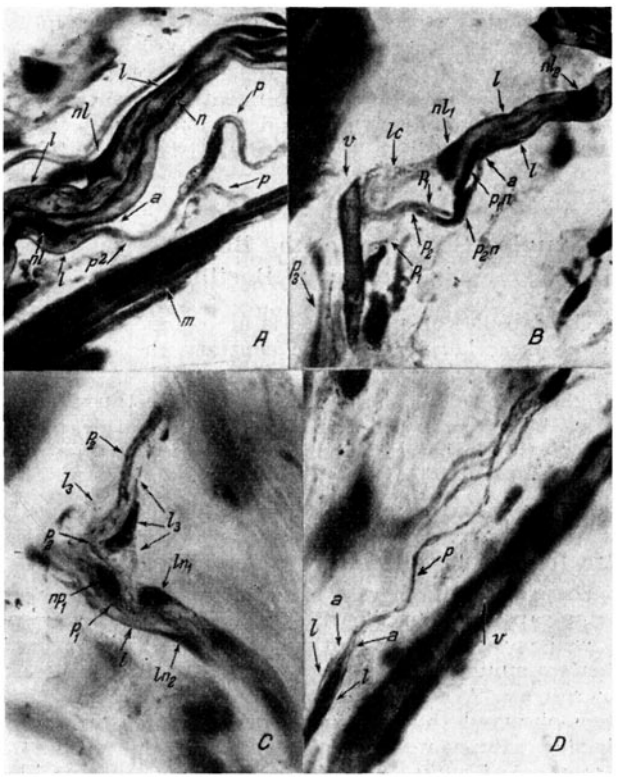
Zusammenfassung

Ein komplexer Aufbau der Bakterienkapsel wurde sowohl bei *Bacillus megatherium* wie bei einem nicht klassifizierten, dem *Bacillus anthracis* nahestehenden Mikroorganismus nachgewiesen. Eine gruppenspezifische Substanz, die serologisch mit dem Polypeptid des *Bacillus anthracis* bzw. des *Bacillus subtilis* identisch ist, bildet gleichmäßig verteilt die Hauptmasse der Kapsel. Eine typenspezifische Substanz, wahrscheinlich aus Polysacchariden bestehend, bildet das Gerüst der Kapsel und begrenzt in Form von deutlichen, transversalen Septa die einzelnen Bazillen innerhalb einer Kette bis zum Rand der Kapsel.

[1] G. KNAYSI, J. Bact. *19*, 113 (1930).

Lemmoblastes et Plexus sympathique fondamental

Le plexus sympathique fondamental de BOEKE et le système des cellules interstitielles de CAJAL représentent une seule et même formation nerveuse (LEEUWE[1], JABONERO[2]) dont les rubans de neuroplasme muni de noyaux, de vacuoles, de granulations argentophiles et de neurofibrilles, s'anastomosent avec les «expansions» des cellules ganglionnaires du type II de DOGIEL (LEEUWE[1], LI PEI-LIN[2], JABONERO[3]) pour constituer le «territoire syncytial» du système neurovégétatif, c'est-à-dire «the final common path» des voies végétatives efférentes, sympathiques et parasympathiques. Cette formation nerveuse syncytiale constitue le pôle nerveux de la synapse plexiforme à distance (JABONERO[3]) et leurs rubans, manquant de toute gaine, émettent le médiateur chimique dans les espaces tissulaires.



Figures *A*, *B* et *C*: Peau de l'aréole mammaire humaine.
Figure *D*: Muqueuse du larynx humain.
(L'explication dans le texte).

Mais, dans quelques organes ou territoires (peau, utérus, larynx, etc.), on trouve un petit nombre de rubans de ce syncytium logé à l'intérieur de gaines tubuleuses (fig. *A–D*). La figure *A* montre une gaine tubuleuse (*l*) enveloppant un petit faisceau de rubans du syncytium nerveux et une fibre nerveuse sensitive (aréole mammaire). La gaine se trouve constituée par un syncytium dont les noyaux sont nettement visibles (*nl*) et montre une ouverture par laquelle sort un ruban nerveux (*p*) muni d'un noyau et de vacuoles, pour s'anastomoser avec les rubans p^1 et p^2 situés au voisinage immédiat d'une masse de musculature lisse (*m*). La figure *B* montre un dispositif différent, car la gaine s'interrompt subitement, laissant libres les deux rubans nerveux (p^1 et p^2). A l'extrémité de la gaine, on observe un noyau (nl^1), un autre noyau se trouve à très peu de distance, dans le trajet de la gaine. Les deux rubans nerveux possèdent des noyaux (*pn*) et se dirigent vers un petit vais-

[1] H. LEEUWE, Thèse (Utrecht 1937).
[2] V. JABONERO, Acta anat. *6*, 14 (1948).

[1] H. LEEUWE, Thèse (Utrecht 1937).
[2] LI PEI-LIN, J. Anat. *74*, 348 (1940).
[3] V. JABONERO, Acta anat. *6*, 14 (1948); *11*, 490 (1951).