M0001171: Bacteria: framed display board

Publication/Creation

15 August 1930

Persistent URL

https://wellcomecollection.org/works/vsg8mz5y

License and attribution

Wellcome Collection
183 Euston Road
London NW1 2BE UK
T +44 (0)20 7611 8722
E library@wellcomecollection.org
https://wellcomecollection.org

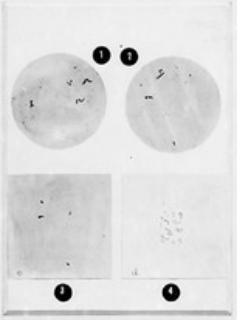
BACTERIA

DISEASE DID NOT EXIST WITH THE MOST ANCIENT BACTERIA. THEY WERE HARMLESS AS ARE MOST OF THE BACTERIA OF THE PRESENT DAY. WHETHER BACTERIAL ORGANISMS WERE INSTRUMENTAL IN EFFECTING THE ORIGIN OF DISEASE IS NOT KNOWN. THIS IS A WIDE FIELD OF STUDY WHICH HAS BUT VERY BEEN EXPLORED. IN A LATER GEOLOGICAL PERIOD BACTERIA HAVE BEEN FOUND IN PARTIALLY DECAYED BONE, TOGETHER WITH THREAD MOULD AND OTHER TYPES OF FUNGI. THIS CONDITION, HOWEVER, CANNOT BE REGARDED AS DISEASE BUT AS DECAY IN DEAD MATERIAL. THE EARLIEST ANIMALS APPEARED TO BE FREE FROM DISEASE, ALTHOUGH THEY WERE SUBJECT TO INJURIES INCIDENT TO THE LIFE OF ANY CREATURE.

THE COAL PERIOD WITNESSED THE EARLIEST WIDESPREAD CONDITION OF BACTERIA AND FUNGI, AND POSSIBLY WAS A WITNESS OF THE BEGINNING OF BACTERIAL DISEASE, ALTHOUGH THERE HAD BEEN PREVIOUSLY A MILD FORM OF PATHOLOGY DUE TO THE ACTION OF ANIMAL PARASITES. THE FIRST DISEASED CONDITIONS PRESERVED ARE OF COURSE NOT THE EARLIEST MANIFESTATION OF DISEASE, SINCE DISEASE IS DOUBTLESS THE RESULT OF LONG AGES OF STRUGGLE BETWEEN THE TWO CONTENDING FORCES OF NATURE.

THE BACTERIA DISCOVERED BY WALCOTT CONSISTED OF INDIVIDUAL CELLS AND APPARENT CHAINS OF CELLS WHICH COMPARE IN THEIR PHYSICAL APPEARANCE WITH THE CELLS OF MICROCOCCUS. ANALOGOUS FORMS OF BACTERIA ARE COMMONLY SEEN IN MANY RECENT DISEASES.

THIS WAS NOT THE EARLIEST DISCOVERY OF BACTERIA IN A FOSSIL STATE, HOWEVER, FOR VAN TIEGHEM HAD RECORDED THE PALAEOZOIC BACTERIA IN 1879. THESE WERE DISCOVERED IN SILICIFIED VEGETABLE REMAINS FROM THE COAL MEASURES OF ST. ETIENNE, FRANCE, IN WHICH THE CELLULOSE MEMBRANES EXHIBITED TRACES OF FERMENTATION SUCH AS IS PRODUCED BY BACILLI AT THE PRESENT DAY.

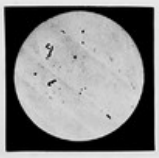


THE OLDEST KNOWN BACTERIA

1, 2. Micrococcus species unit. (X about 1100 diameters).
Algonkian: Gallatin Formation, Montana.

3. Staphylococcus (?), isolated from Pumpkin concretions. X 1300.

4. Characteristic groups of Micrococcus vesicus. Very highly magnified.



The oldest known bacteria, designated as Micrococcus from the pre-Cambrian rocks of Montana, had no relation to disease. It has been suggested that these bacteria were of the type which caused the deposition of calcium from sea water. They are associated with algae which may be seen in the broad stripes running diagonally across the field.

THE OLDEST BACTERIA

THESE ARE AMONG THE OLDEST INHABITANTS OF THE EARTH. IT HAS EVEN BEEN SUGGESTED THAT WHILE THE EARTH WAS STILL IN THE PROCESS OF BUILDING BY THE ACCRETION OF METEORITES BACTERIA WERE CARRIED TO THE EARTH FROM DISTANT PLANETS AND THUS INITIATED LIFE ON EARTH. BACTERIA HAVE ACTUALLY BEEN FOUND IN THE OLDEST FOSSIL-BEARING ROCKS OF NORTH AMERICA IN 1904 BY DR. CHARLES D. WALCOTT. THESE WERE FOUND IN ASSOCIATION WITH ALGAL DEPOSITS OF THE BELAND LIMESTONE, A FORMATION OF THE BELTIAN SERIES OF ALGONKIAN (PRE-CAMBRIAN) ROCKS OF CENTRAL MONTANA. WALCOTT HAD PREVIOUSLY SUSPECTED THE ACTIVITY OF BACTERIA AS AN IMPORTANT FACTOR IN THE DEPOSITION OF THE ALGONKIAN LIMESTONES. WHILE NOT DIRECTLY RELATED TO DISEASE HIS DISCOVERY REVEALS THE PRESENCE OF A TYPE OF LIFE SO IMPORTANT TO DISEASE, AT THE VERY BEGINNING OF THE GEOLOGICAL HISTORY OF ANIMALS.

FAR FROM BEING DISEASE PRODUCING THE EARLIEST TYPES OF BACTERIA WERE DOUBTLESS OF THE KIND WHICH ASSIST IN WITHDRAWING CALCIUM FROM THE SEA WATER. THEY WERE ROCK BUILDERS. AN ANALOGOUS FORM EXISTS IN THE ATLANTIC OCEAN AT THE PRESENT DAY, AND IS ESPECIALLY ACTIVE AROUND THE WEST INDIES IN BUILDING UP THE CORAL REEFS.

THE FORM OF THESE MOST ANCIENT GERMS IS SO SIMILAR TO THAT OF RECENT BACTERIA THAT THEY ARE CALLED MICROCOCCUS. A BACTERIAL FORM WHICH IS ESPECIALLY COMMON TO-DAY. CONSIDERABLE COMMENT HAS BEEN ADDRED AS TO THE POSSIBILITY OF SUCH DELICATE ORGANISMS AS BACTERIA BEING CAPABLE OF PRESERVATION IN A FOSSILIZED CONDITION. THIS IS, HOWEVER, FAIRLY DEFINITELY SETTLED BY INVESTIGATIONS IN OTHER LINES. FOSSIL WOODS, FOSSIL FLOWERS, FOSSIL BLOOD, AND FOSSIL MUSCLE ARE KNOWN TO BE SO WELL PRESERVED THAT THERE IS PERMITTED AN EXAMINATION OF THE MINUTE STRUCTURE OF THE TISSUES.

GEOLOGICAL DISTRIBUTION OF DISEASE

THE INTRODUCTION OF DISEASE AMONG THE EARLY ANIMALS WAS DOUBTLESS A GRADUAL PROCESS AND THE VERY OLDEST EVIDENCES WERE SO INDEFINITE AS TO BE UNRECOGNIZABLE. THE INTIMATE ASSOCIATION OF ANIMALS DURING THE EARLY PART OF THE PALAEOZOIC RESULTED IN CONDITIONS OF SYMBIOSIS AND A MILD FORM OF PARASITISM WHICH ARE THE FIRST PHASES OF DISEASE FOUND IN THE HISTORY OF ANIMAL LIFE ON EARTH.

THAT PATHOLOGICAL LESIONS, ESPECIALLY THOSE ON THE BONES, RETAIN ALL OF THEIR CHARACTERISTICS AFTER MANY THOUSANDS OF YEARS HAS BEEN CLEARLY SHOWN AND DISTINCT EVIDENCES OF DISEASE ARE KNOWN AS FAR BACK IN GEOLOGICAL TIME AS THE EARLY PALAEOZOIC. REASONING FROM THE THEORETICAL ASPECTS OF PALAEOPATHOLOGY, OR THE BASIS OF POSSIBLE PARASITISM OF EARLY FORMS, DISEASE MAY HAVE ORIGINATED IN THE ARCHAEOZOIC, BUT THERE IS NO DEFINITE, RECORDED EVIDENCE.

THERE ARE NO KNOWN CASES OR EXAMPLES OF INFECTION, NO TUMORS, FEW TRAUMATIC LESIONS OR INJURIES OF ANY KIND PRIOR TO THE DEVONIAN. IN AN INTERESTING CASE OF PARASITISM FROM THE MISSISSIPPIAN OF INDIANA, SHOWING ON THE TRUNK OF THE CRINOID ECCENTRIC GROWTH MARKS MADE BY AN ATTACHED SNAIL, THERE IS REPRESENTED THE MERGIN FORM OF PARASITISM ASSUMED EARLY IN THE PALAEOZOIC; A CONDITION LASTING UNTIL NEAR THE CLOSE OF THAT EPOCH.

THE OLDEST EXAMPLES OF PSEUDO-PARASITISM KNOWN IN PALAEOZOIC ANIMALS BELOW RESULTED IN THE FORMATION OF EXCESSIVE PATHOLOGICAL GROWTH, BUT WERE USUALLY BENIGN IN THEIR RESULTS. THE VERY BEGINNINGS OF DISEASE WE MAY NEVER SEE AND WE ARE NOT SAFE IN SAYING THAT DISEASE BEGAN AT A TIME WHEN WE FIND THE FIRST OBVIOUS LESIONS. A PERIOD OF TIME ENORMOUS IN EXTENT ELAPSED BEFORE PATHOLOGY HAD PROGRESSED SUFFICIENTLY TO PRODUCE VISIBLE RESULTS IN THE HARD PARTS OF EARLY ANIMALS.