PRELIMINARY NOTE ON THE BACTERIA OF POISONOUS MUSSELS.

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IN the BRITISH MEDICAL JOURNAL of July 19th, there appears a note by Sir Charles Cameron on the melancholy case of mussel-poisoning at Seapoint, near Dublin, by which Mrs. O'Connor and her four children lost their lives on June 30th. Sir Charles Cameron dealt with the case chiefly from the chemical standpoint. Feeling a considerable interest in the matter, I procured a number of mussels from the same pond, through the kindness of Mr. McCormack and Mr. Gore-Cuthbert, and subjected their micro-organismal contents to examination in the Bacteriological Laboratory of the Mater Misericordiae Hospital. The investigation is still far from concluded, but the following preliminary account of the results arrived at may be of interest:

The mussels were alive at the time of examination, and evolved no offensive odour. Their shells, as remarked by Sir Charles Cameron, were brittle. After a careful exterior cleaning, one of the mussels was rapidly opened with a sterilised knife, and cultivations were started from (a) the liver, (b) the byssus, (c) the water contained between the shells. An enormous number of colonies developed from (b) and (c); but, following Lustig (see below), I applied myself specially to (a), and the following account applies to the liver cultures exclusively: A small portion—about a decigramme—of the liver was carefully and quickly cut away with sterile knife and forceps, and placed in a test tube charged with the usual quantity of sterile 10 per cent. nutrient gelatine previously liquefied by a gentle heat. From this tube dilutions were made as usual, and three plate cultivations poured out.

Numerous colonies were found on Plate 1 the next day; a few on Plate 2; Plate 3 became contaminated with moulds before anything, save one or two bright-coloured specks of air-sarcinae, had developed. The colonies observed on Plate 1 were of five distinct varieties to the naked eye, namely:

1. Colonies at first globular, immersed in substratum, brownish; quickly reaching surface, and then liquefying with extreme rapidity and completeness. Outline of fully developed colony, round, causing a funnel-shaped depression; contents, greyish, watery material, with flocculent whitish sediment at bottom. Odour unpleasant. The flocculent material, which consisted of masses of organisms, had a tendency to arrange itself in a peculiar radiating manner. The smaller colonies were often provided with a peculiar double contour; when viewed under obj. III, oc. I (Leitz). So-called "stich-culturen," made from these colonies, liquefied the tube rapidly and completely in a very regular funnel-shaped manner, the bottom being occupied by flocculent masses of organisms. "Ausstrich" cultures on "schräg agar-agar" gave thick greyish films with irregular margins. The agar, of course, was not liquefied. On potatoes, a yellow film of greasy appearance, with irregular margins, was produced.

Microscopically, all these cultivations gave a comma-shaped organism, actively motile, as a rule, though sometimes its movements in the hanging drop were so slight as to be hardly distinguishable from the Brownian. The average length was 1.5μ in the recent cultivations. Specimens taken from old tube cultivations which had completely liquefied presented numerous spirillum forms, as many as four turns of the spiral being observable in the one individual, and the length 2.5 to 3μ . The potato cultivation, which was conducted after von Esmarch's method, also gave numerous spirilla, as well as comma forms. Methylene blue and carbol fuchsin were the stains employed, and no attempt has been made hitherto to stain for cilia, or to test the applicability of Gram's method. The odour evolved by the old cultures, which had completely liquefied the gelatine in the tube, was excessively unpleasant.

2. In addition to the above there were small, round, non-liquefying colonies, strikingly prominent above the surface of the gelatine. Their colour was at first whitish, then strongly fluorescent, tinging the gelatine by which they were surrounded. "Stich culturen" were typically "nail-shaped," the growth being almost entirely superficial; along the needle track there was but a slight growth. The surface of the colony flashed green and red, and looked like mother-of-pearl. A thick, creamy, greenish-yellow covering appeared on schräg agar-agar, also fluorescing. Micro-

scopically not at all, or but slightly, motile; rods 1.5 to 2.5μ long, sometimes with rounded ends. Sometimes clear dots were observable in methyl blue-stained specimens; these dots looked like spores. Sometimes the bacillus itself seemed but faintly coloured, but had a brightly-stained dot at one end. It was not to be found in every preparation.

3. Very small, round, non-liquefying colonies, semitransparent, bluish-white, slow of growth. In test tubes but little growth, and that superficial. "Impfstich" marked by trail of isolated whitish granules, especially towards its deeper end. "Ausstrich" on agar gave almost transparent pellicle with wavy margin. Microscopically, non-motile rods, very minute, 0.8 to 1μ in length. Some looked as if the centre of the rod were marked with a pel-lucid dot.

4. Indefinite cloudy masses, which, on examination with a low power, proved to consist of enormous numbers of very minute, almost perfectly transparent, circular colonies. "Stich-culturen" grew to a very slight extent only; colour whitish, growth chiefly on surface of gelatine. Microscopically, rod forms frequently constricted in middle, and then looking like two oval cocci placed end to end; average length of such double forms, 2.2μ ; non-motile, non-liquefying.

5. The last colonies to make their appearance were small, round, very prominent, white, non-liquefying. Transplantations by "stich" into gelatine hardly grew at all. Microscopically, there were extremely short rods or oval cocci, with light spot in centre, somewhat resembling in appearance Fränkel's diplococcus pneumoniae.

Coming to the question of the identification of these organisms with forms previously described, the resemblance of (1) to Finkler-Prior's bacillus will at once strike the bacteriologist. In this connection it is only right to note that Lustig¹ isolated a pathogenic bacillus from the liver of specimens of *mytilus edulis*. It consisted of delicate straight rods, 0.8 to 1μ in length, and growing into spirilla in old cultures. It was motile, and cultures bore a general resemblance to those of Finkler-Prior's bacillus. Lustig found that, introduced into the alimentary canal of rabbits and guinea-pigs these organisms caused death in from eight to twenty-four hours. On *post-mortem* examination, acute enteritis was found; subcutaneous and intravenous injection proved ineffectual. The organisms were recovered from the blood of the animals which had died under the experiments.

The organism I have characterised as (2) above, resembles one of the well-known fluorescing water-bacilli. I mean that which is described in Tabelle 30 of J. Eisenberg's *Bakteriologische Diagnostik*, Hamburg, Voss, 1888. The others I have not yet worked out sufficiently for any diagnosis to be of value.

Without venturing to put forward a definite judgment on the matter, I am rather inclined to think that organism (1) may possibly have for one of its metabolic products some poisonous leucomaine or albumose, to whose effects on the human economy the melancholy tragedy at Seapoint was due. Until the other organisms have been suitably examined, however, and until the effects of organism (1)—and indeed of the others also—on animals have been tested, the question is not ripe for decision. No use was made of the incubator, all the cultures being conducted at the ordinary temperature of July in Dublin. Later on I hope to be able to publish more complete results.

¹ Archivio per le Scienze Mediche, vol. xii, 1888, No. 17.

COVENTRY (Population, 51,000).—Prevalence of Zymotic Disease, especially Measles, Typhoid Fever and Scarlet Fever: Sanitary Requirements of the City.—The year 1889, viewed from a public health point of view, was not altogether satisfactory in Coventry. Dr. Mark Fenton states that the death-rate, 17.5 per 1,000, was higher than during the two previous years, and was above the average of the present decade. Zymotic disease was prevalent throughout the whole year, scarlet fever in the early months, measles and typhoid fever in the autumn. Measles alone produced fifty deaths. Typhoid fever appeared in almost every instance as the result of neglected sanitation. The reforms needed to be carried out in Coventry are—the provision of an increased water supply, the adoption of more efficient measures for the improvement of the dwellings of the poor, the provision of a public abattoir, the increase of the staff of nuisance inspectors, and the institution of a more regular system of inspection, and a more prompt removal of nuisances, the adoption of proper by-laws, and the provision of a refuse destructor.