tering of knowledge that the sum total of knowledge can grow and real progress be made in general improvement in methods of design and construction.

If we attempted to answer the question, In what particular aspect has the increased knowledge in sanitary engineering made itself manifest in 1909, we would answer, in an increase in modesty and greater recognition of limitations. It is no longer common to hear of the absolute solution of the sludge difficulty, of the total disappearance of everything organic, of wonderful bacteria, which eat up everything and nothing remains, of the total destruction of pathogens, either in tanks or filters, of a liquid effluent equal in every respect to good drinking water. All these assumptions are fast becoming things of the past. They were but the optimistic products of half knowledge. Even the word sterilization is being modified to the reasonable term disinfection. But having learned more definitely the reality of limitations, we are also learning in what manner these limitations can be modified. The year 1910 will see great advance made in the science of sanitary engineering.

A TOWN ENGINEER'S SALARY.

At times we hear murmurs of discontent from Canadian engineers because of the difficulty of persuading some practical people that advice (the result of special scientific and technical training) is something which should command a monetary value. However, we have not yet been able to report of any Canadian municipality as the "Surveyor and Municipal and County Engineer" journal reports in its issue of 3rd inst.

We occasionally hear of starvation wages and the difficulty of eking out an existence in the Old Country, and as an example which, we trust, is remarkable as an exception we quote this interesting case, vouched for by the above journal:—

"At an inquiry recently held by Mr. P. M. Crosthwaite, a Local Government Board inspector, into the details of a loan for which official sanction was sought by the Okehampton Corporation, a request was urged by the town clerk that the borough surveyor's remuneration should come out of the proposed loan. The inspector stated that this was contrary to the Local Government Board's practice. Replying to a question, the borough surveyor, Mr. F. J. Worden, said he received $12.50 per quarter as surveyor. "Do you do any work for this?" Mr. Crosthwaite asked, in terms that seem to suggest more than irony, while he added grimly: 'I suppose they cannot expect much.' In this supposition he would appear to be quite wrong, for the clerk promptly replied, 'I think they do.' Here, indeed, is an example for admiration of the inverse order, for it is surely a matter of difficulty to determine which to admire least, the effrontory of a municipal authority which offers such a 'salary,' or the excessive modesty of the official whose self-appreciation is such as to enable him to accept it. Now that we know the remuneration of the surveyor the public interest in the internal affairs of the Okehampton Corporation might be meticulously extended so as to inquire the salary by means of which the lucky office boy is assisted to lead a life of affluence and self-indulgence."

THE SANITARY ENGINEER IN RELATION TO THE CHEMIST.*

The chemist can be of some help to the engineer when designing the works to purify a given sewage; such help can only be of use when the chemist has the confidence of the engineer with respect to the proposed scheme.

A sample of sewage is often sent to the chemist; all that he is asked to do is to analyse it; most probably the items of the analysis he gives are to the engineer of very little use—e.g., the total solids are given which includes grit and sludge, also that in solution, and presuming the engineer is proposing to construct grit tanks and sedimentation tanks, the total solids give him the combined quantity, and therefore he has no information from the analysis of the amount of grit to expect and the amount of sludge to clean out from his tanks. If the chemist was informed that two tanks for the separation of each class of solids were proposed to be constructed, he would know, if he had any practical experience of the subject, exactly what was required, and so be able to give the engineer a result of analysis of practical use.

With the experience gained during the past fifteen years by those who have studied and worked amongst sewage purification plants, the final results are not such chance results as formerly. A new works can be so constructed as to give any desired state of purification with certainty. To do this, much information must be gathered both of an engineering and chemical nature. With regard to the latter, the following points must be known: (1) Quality of the sewage both chemically and physically; (2) the final state of purification required under the circumstances. These having been obtained and combined with the engineering portion, would give the engineer data on which he could construct works to give the desired purification.

Where the works chemist has charge of the sewage purification plant, he must necessarily have some little knowledge of engineering, as he has often to do work that is more of an engineering nature than chemical, such as gauging the volume being treated, etc. With sewage purification, engineering is really more in evidence with respect to the physical side, but the works' chemist has also to study the physical portion in some degree to find out the cause of many of the effects he meets with. When the chemist has some little knowledge of engineering he can give his deductions a more practical value to the engineer.

Many results of analyses are made valueless for practical purposes through many causes, the following being a few:—Where a number of samples are taken at different parts of the process, due regard not being taken of the time of passage, such as through tanks, filters, etc., consequently the samples are not in series and cannot be strictly comparable; the taking of samples without any record of the conditions prevailing before or at the time which might alter the composition, and so not allow a proper deduction to be made from the results obtained; taking a sample in a dirty bottle; not filling the bottle when the amount of dissolved oxygen is required to be estimated, and many other details in which a sample may be spoiled.

To know exactly whether a purification plant is working to the best advantage, samples should be taken at regular intervals of time; a record kept of the working of the plant, so as to be available for reference in case of any deductions required from results obtained by analysis."

*Extracts from a paper by M. G. E. Farmer, F.C.S., chemist, Croyden Sewage Works.