

THE POSITION OF ANALYTICAL CHEMISTRY IN FRANCE.

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LET me say at once that the present article deals solely with the professional side of the subject. Information regarding recent development and progress in Analytical Chemistry can be gathered easily from periodicals devoted to it, but one looks in vain for enlightenment concerning the conditions under which the profession is carried on. Such conditions are, nevertheless, important, even from a purely scientific point of view, for they react on the quantity and quality of original work done, especially in a branch of science where the bulk of the research is done by the rank and file.

EDUCATION.

One of the chief drawbacks to a satisfactory organisation of the analytical profession in France is the lack of an institution devoted entirely, or mainly, to its teaching. Chemistry is taught in the Science Departments and in a number of Institutes of Applied Chemistry attached to various Universities throughout the country. Such are the Institutes of Applied Chemistry of Paris, Lyon, Nancy, Lille, Toulouse, Clermont-Ferrand, the Electrochemical Institute of Grenoble, and the School of Chemistry of Bordeaux. Training in Analytical Chemistry is also given in the Higher Schools of Pharmacy and in the Municipal School of Physics and Chemistry of Paris. The Pasteur Institute, the National Agronomic Institute, and various other bodies have courses devoted to more or less specialised branches of Chemistry.

The training received by the student naturally varies greatly from place to place. At the Institute de Chimie Appliquée of Paris, a three years' course is provided, at the end of which a degree of "ingénieur-chimiste" is conferred on the candidate who has successfully passed the examinations, one at the end of each year. This Institute will no doubt play in future a more important part than it has done so far in chemical education. The premises which it occupies at present bear a not very flattering testimony to the esteem in which Applied Chemistry was held in France before the war. Students and apparatus are crowded together in a set of irregular buildings entirely unsuited for such use. Fortunately the lessons of the great war have not been all unheeded. The University of Paris, realising the great importance of Applied Chemistry in modern life, has decided to move the Institute from its old site at 3, Rue Michelet, to more spacious premises at the centre of the University grounds, Rue Pierre Currie. The new building is rapidly being completed, and provided with all necessary modern appliances and with every comfort for the students.

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THE TITLES OF "CHIMISTE-ANALYSTE," "CHIMISTE-EXPERT," AND
"PHARMACIEN-CHIMISTE."

None of the educational bodies so far mentioned confers a degree in analytical chemistry, and the title of "chimiste-analyste" is fully as much abused in France as its equivalent is in England. The profession includes :

(i.) Chemists employed in the various laboratories in connection with the repression of frauds, or who occupy other official positions.

(ii.) Those placed on the list of experts to the Courts of Justice, who may be called as advisers in chemical matters.

(iii.) Analytical and consulting chemists with private laboratories, of whom there are relatively few.

(iv.) Pharmacists in business who undertake certain kinds of analytical work, especially of a biological character.

Following the insistent efforts of M. Cazeneuve, a law was passed in 1913* creating a title of "chimiste-expert du Government." The jury examining for this qualification is composed of teachers from the higher colleges which impart chemical training, and of members of a Permanent Technical Committee attached to the Ministry of Industry and Commerce. The law provides that special courses in analytical chemistry shall be instituted at certain Universities for training candidates already possessing an advanced knowledge of chemistry. The "chimistes-experts" exercising the profession previous to the legislation could obtain the new title on showing that they possessed an adequate qualification.

A recent bye-law (June, 1920) creates a post of "pharmacien-chimiste" in the Army, obtained by competition before an examining jury. The duties of the pharmacien-chimiste in peace-time include the analysis of foods and water supplies, and the assay of drugs and chemicals intended for military hospitals. In time of war they would be placed in charge of the Army Chemical and Toxicological Laboratories.

PROFESSIONAL ASSOCIATIONS, PERIODICALS.

There is much similarity between the French and the English chemical associations. Thus the Société des Chimistes-Experts de France corresponds to the Society of Public Analysts and other Analytical Chemists, and the Société des Chimistes Français has more than one point in common with the Institute of Chemistry as modified of late.

The first-mentioned Society aims at bringing together all those who are, or intend to be, nominated as "chimistes-experts" to the Courts of Law. Its official organ is the *Annales des Falsifications*. No special qualifications are required for membership. The Society was formed in 1912, and two years later had acquired over 500 members (the total number of chemists inscribed on the expert-lists is about 1,000). The following list gives the occupation of the members, and is interesting as showing approximately the proportion of different kinds of "analytical chemists."

* This Act, pending the promulgation of further bye-laws and regulations, has remained without practical application so far.

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Government officials (chemists employed in municipal laboratories, etc.)	187
Military (pharmacists in the Army, Navy, and Colonies)...	66
Chemists, free	79
Pharmacists, civil	153
Various (industrials, doctors, engineers)	26
Total	511

The other and more recent Association, the Société des Chimistes Français, was intended to include all chemists of French nationality. It is divided into an industrial and an analytical section, the members being further classed in different categories according to qualification and experience possessed. The *Annales de Chimie Analytique* has become the organ of the Society, which has at present some 460 members. Both the above societies are making numerous efforts to improve the social and material conditions of the analytical chemists.

THE ORGANISATION IN CONNECTION WITH THE REPRESSION OF FRAUDS.

Special legislation for the inspection of pharmaceutical and allied products existed in France at an early period (law of 21 Germinal, year XI.), but the first important modern legislation for the protection of the public from adulterated food was passed in 1905. This and subsequent bye-laws instituted various services for the purpose. The inspection of foodstuffs, beverages, and products for agricultural use is entrusted to officials nominated by the prefect (the county representative of the Home Office). These officials, of which there are some 1,000 throughout the country, occupy the ranks of police inspector, veterinary, county, or municipal agents. Their payment consists of a fixed small fee per sample taken in addition to travelling expenses. A certain number of Syndicates provide the authorities with experienced agents at their own expense. A chief inspector and fourteen county inspectors are charged with the control of this organisation.

Of the four identical samples sealed by the agent at an inspection, three are retained for subsequent reference and one is forwarded to an official laboratory. There are forty such laboratories maintained by different towns or counties. The Government also contributes to their upkeep by an amount depending on the number of samples analysed annually. This is fixed at 1.75 analyses per 1,000 inhabitants, which gives a total of 70,000 analyses carried out yearly in the whole of France.

The most important of the above-mentioned laboratories is the Laboratoire Centrale d'Analyse des Matières Alimentaires, of Paris. It is almost elegantly maintained, and consists of seven principal laboratories: two of these are devoted to the analysis of wine, carried out in a very thorough manner; two others are allotted to oils and fats, and the rest to other articles of food. An important part of the work consists in the testing of new analytical methods. If these are found more reliable than the ones already in use, circulars are sent out rendering their employment compulsory in all official analyses.

For the analysis of certain classes of products there exist special laboratories; for instance, the Laboratoire des Produits Résineux at the University of Bordeaux and

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the *Laboratoire des Conserve de l'Armée*, the latter for the supervision of preserved meat and fish.

The surveyance of drugs and similar products is quite distinct from that of food. Pharmacies, dispensaries, and mineral water factories must be inspected yearly by a pharmacist nominated by the prefect on the recommendation of the local Faculty, or School, of Pharmacy. Drug stores, perfumeries, and other premises where medicinal or hygienic preparations are sold, are also subject to inspection. The analysis of suspected materials is carried out in laboratories attached to the Schools of Pharmacy, but placed under the supervision of the Ministry of Agriculture. Twenty such laboratories exist in France. The one in Paris is naturally the better organised. In addition to the analysis of drugs and chemicals there is a bacteriological section for the testing of the germicidal power of disinfectants, the adequate sterilisation of surgical dressings, etc. Further, a large amount of research is always in progress.

OTHER LABORATORIES.

The Municipal Laboratory, attached to the Prefecture de Police of Paris, devotes much of its activity to food analysis, biological examinations, and physiological testing for private individuals, at a nominal fee. It possesses more extensive accommodation, but is less conveniently arranged than either of the previously described laboratories.

At the *Institute des Arts et Métiers* there is a Department corresponding to the National Physical Laboratory of Teddington; its Chemical Section undertakes the testing and assaying of lubricating oils, alloys, and other industrial products.

Finally may be mentioned the *Laboratoire d'Essais de Semences* for the testing of seeds, and the *Institute Pasteur* for biological examinations.

It will be seen from the above-outlined description of French institutions that the work carried out in England by the Public Analyst is divided in France amongst several organisations. This division of labour has its disadvantages, and overlapping cannot be avoided, for instance, in the case of substances, such as olive oil, which are used both as food and for pharmaceutical purposes. But one undoubtedly good point is the official testing and unification of analytical methods, which would render impossible the promulgation of orders or regulations which cannot be carried out such as the recent Cocoa Order of the Food Controller, which set a limit to the amount of shell allowable, without indicating the method to be followed for its estimation.

DISCUSSION.

Mr. CRIBB said that the Report of the Eighth International Congress of Applied Chemistry contained a series of papers on the methods adopted for dealing with adulteration in Canada, the United States, and most of the Western European nations. From Mr. Cofman's paper it would appear that no noteworthy advances had been made in France, either in legislation or administration, since the date of that Congress.

The most important of the French laws relating to adulteration were, however, passed as recently as 1905, and, as there was a central executive, more likely to be

better and more uniformly administered than was possible with the worn-out laws in force in this country.

In two directions the French system was ahead of ours. They could take samples from the wholesale dealer and manufacturer, and the judge was allowed the assistance of a scientific expert in difficult cases. There was some reason for hoping that before long our more or less obsolete legislation would receive the attention of the Government, and such papers as that of Mr. Cofman and those to which he referred, would afford very useful suggestions.

