Nancy Colloquium on the Mechanism of Carbon Combustion, September 27–30, 1949

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THE REACTION OF CARBON WITH OXYGEN is probably the chemical reaction used more than any other one. However, our knowledge of its mechanism is still surprisingly limited. It was, therefore, of great general interest that the Centre Nationale de la Recherche Scientifique of France organized a colloquium on the combustion of carbon, in Nancy, France, September 27–30, 1949. Only about twenty-five to thirty scientists invited from France, Belgium, England, and this country participated. In this way a splendid opportunity was created for a thorough exchange of opinion in a field where there are many discrepancies between the different investigations.

The colloquium was opened by Professor Terroine, president of the foreign relations commission of the center, who welcomed the visitors and stressed the importance of research and the exchange of ideas for postwar recovery.

The first day was devoted to fundamental research. R. Strickland-Constable (London), X. Duval (Nancy), and L. Meyer discussed the reactions of pure graphite with pure oxygen, CO_2, H_2O, and N_2O under such conditions (e.g., very low pressures) that one can be reasonably sure of investigating only the primary reaction of the attacking gas with the solid surface. Such investigations were initiated in 1915 by I. Langmuir, who even then found contradictory results. The discrepancies between the more recent investigations are still far beyond ordinary experimental errors and are probably due to the peculiar properties of graphite.

There exists an almost continuous transition from amorphous carbon to graphite. Graphite itself has a great tendency for "stacking errors." The graphite crystal consists of parallel planes of carbon atoms arranged in neat hexagons and held together by strong chemical bonds. Each plane is held to the next by comparatively weak van der Waals forces. Even if the planes are parallel to each other there still exists a great variety of possible "disorder" in the sense that the planes may be rotated relative to each other around the hexagonal axis.

Miss R. Franklin (Paris) reported on a very interesting systematic investigation of the transition from amorphous carbon to graphite over different crystal sizes and different degrees of order. The distance between ordered planes is 3.34 A, but increases to 3.41 A if a stacking error occurs. The apparent distance found in x-ray pictures depends on the degree of order, as it is the average of the number of ordered and the number of disordered distances.

Usually stacking errors and similar faults in crystals produce only effects of second order. In graphite they apparently have a strong first order influence on physical properties (such as electric conductivity) and kinetic behavior in chemical reactions. The amazing discrepancies in kinetic investigations (not only of the primary reaction but also technical investigations) probably must be blamed on differences in degree of order and crystal size. H. L. Riley (Worksop, England) emphasized, therefore, the necessity for a better correlation of systematic structure investigations with kinetic research.

Audubert and Busso (Paris) reported on experiments to measure and evaluate the radiative effects of the reaction $C + O_2$. Daudel (Paris) discussed the properties of graphite from the point of view of quantum mechanics, and Busso compared these calculations with experimental evidence.

The contributions about the reaction of carbon in the form of fuel under conditions similar to the technical processes revealed such an amazing amount of detailed experience (partly due to British wartime research) that it is impossible to give a short account. The group (D. T. A. Townsend, D. H. Bangham, H. C. Crone, J. R. Arthur) representing the British Coal Utilization Research Association (BCURA, Leatherhead, England) presented extensive material about widely differing problems such as the role of peroxides in the oxidation, the modes of burning of fuel, the mechanism of energy release, and the influence of impurities on the mode of combustion. The latter problem was also discussed by K. W. Sykes (Swansea, England) on the basis of wartime research results. E. Mertens (Louvain, Belgium) and Arthur (BCURA) tried to determine the primary reaction of combustion at the surface by adding substances which inhibit secondary reaction in the gas phase. Prettre (Lyon, France) gave a short report on an improved method of calculating producers.

M. Letort (Nancy) and his co-workers presented new details about the "supercombustibility" discovered by Letort. If a fuel is kept at reaction tempera-

ture in an indifferent atmosphere—such as N_2—after having burned for a time, the reactivity increases strongly. By repeating this treatment the reactivity can be increased up to five times the initial one.

Papers and discussion remarks were given in English and French. P. Goldfinger (Brussels, Belgium) acted as interpreter; his summaries in the language not used by the speaker were in themselves a valuable contribution to the discussion.

All contributions and the full discussion will be published shortly in *Journal de Physique et de Chimie,* Paris.

The organization of the meeting (by M. Letort, Nancy) was an impressive example of French hospitality. Receptions by the mayor of Nancy and the director of University of Nancy in the respective historic buildings, a night visit to the ancient Ducal Palace, visits to the modern foundry at Pont à Mousson (at whose ancient university Pere Marquette was professor before coming as an explorer to this country) and the salt mine at St. Nichlas gave excellent opportunities to get acquainted with different aspects of life in France. One was convinced that the heroic efforts of France, not only to repair the material damage of the war, but also to keep alive her great cultural tradition, have been amazingly successful.

Symposium on Brucellosis, September 22–23, 1949[1]

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A SYMPOSIUM ON BRUCELLOSIS was held at the National Institutes of Health, Bethesda, Maryland, September 22–23, 1949, under the auspices of the National Institutes of Health, the Bureau of Animal Industry, and the National Research Council. The meeting was organized by C. L. Larson, National Institutes of Health, and C. K. Mingle, Bureau of Animal Industry. Dr. Larson served as chairman at all sessions.

In the opening paper, Alice C. Evans (Bethesda, Maryland) described the early history of brucellosis and the studies which led up to the recognition, in 1918, of the relationship between the *Brucella melitensis* and *Br. abortus* organisms. Dr. Evans advised that the term *undulant fever* be dropped from medical literature because of its erroneous implications. The remainder of the first session was devoted to a discussion of brucellosis in farm animals and its control in the animal population. C. A. Manthei (Bureau of Animal Industry) reported that the artificial immunization of cattle with Strain 19 of *Br. abortus* reduced the duration and severity of the infection following exposure to virulent organisms. Aureomycin had not proved effective in the treatment of cattle infections. L. M. Hutchings (Purdue University), from study of the porcine infection with *Br. suis,* concluded that no satisfactory method of vaccination was yet available, and that the results obtained thus far with aureomycin, streptomycin, and the sulfonamides in therapy of the disease in swine have not justified field trial of these agents. W. L. Boyd (University of Minnesota) pointed out that brucellosis may occur in such farm animals as goats, sheep, horses, dogs, cats, and poultry, although only in the goat and horse, among those species just named, is the infection significant in either human or veterinary medicine in the United States. In closing the morning session, H. L. Gilman (Cornell University) emphasized the importance of the slaughter of infected animals, particularly sporadic reactors, as a method of controlling the spread of brucellosis.

In the afternoon session of the first day B. T. Simms (Bureau of Animal Industry) brought out the fact that as long as the present mobility of the livestock population is permitted, contagious diseases such as brucellosis cannot be stopped at state boundaries. The federal government must work with state livestock sanitary authorities in developing uniform methods of attack on the disease, and aid in preventing reinfection of areas where herds have been accredited. Jacob Traum (University of California) discussed *Br. abortus* Strain 19 vaccine, as used in extensive field trials in California. Robert Pennell (Sharpe and Dohme, Inc.) summarized the research on the fractionation of the *Brucellae* into constituent antigens. As yet, it is not possible to differentiate the species of *Brucella* by chemical means. Protein-nucleates of moderate serological activity and other complexes of high activity have been isolated from

[1] The papers presented are to be published in monograph form by the American Association for the Advancement of Science.

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