

World's Congress.

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CHEMICAL NOTES FROM THE COLUMBIAN EXPOSITION. II.

By J. H. LONG.

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DEPARTMENT H.—MANUFACTURES.

THE chemical exhibits of greatest interest are found in the Department of Manufactures. It must be confessed that as a whole the display is somewhat disappointing, because it is very unevenly distributed, one nation making more than one-half of the whole exhibit.

The nations showing chemicals are the United States, England, France, Germany, Russia, Sweden, and Italy. According to the catalogue, Switzerland makes one display of

chemicals, but it is not present, and what is shown by Italy and Sweden is of very slight importance. The chemical exhibits in this department can be best described under the heads of nationalities, beginning with the United States as in the official catalogue.

1. *The United States*.—While it is well known that the chemical industry of this country is not to be compared with that of several European countries, it is large and important enough to be better represented than is the case in the Columbian Exposition. While it is, perhaps, true that the best known firms are represented here, it is also true that others, turning out equally good products, are not here at all. The chemicals in the Manufactures building are found in Group 87, which contains thirty-eight entries. But it must not be supposed that all these have an interest for the general chemist. By some peculiarities in the method of classification we have, in this group, certain pharmaceutical products, soaps and perfumes, flavoring extracts and druggists' sundries, while similar products are found also in several other groups, some in the Department of Agriculture, and some in the Department of Liberal Arts. Of the thirty-eight American entries in Group 87 but thirteen need be listed here as likely to attract the attention of chemists in general. These are:

- J. J. Allen's Sons, Philadelphia, phosphorus and allied products.
- Henry Bower & Son, Philadelphia, general chemicals.
- Chesebrough Manufacturing Co., New York, petroleum products.
- Fritzsche Bros., New York and Leipzig, essential oils.
- Gordon Chemical Co., Cincinnati, glycerine.
- Hotchkiss Sons, Lyons, N. Y., essential oils.
- Marx & Rawolle, New York, glycerine.
- Pennsylvania Salt Manufacturing Co., Philadelphia, inorganic chemicals.
- Powers & Weightman, Philadelphia, general and pharmaceutical chemicals.
- Richard C. Remmey, Philadelphia, chemical stone-ware.
- Rosengarten & Sons, Philadelphia, general chemicals.
- Rössler & Hasslacher, New York, general chemicals.
- A. M. Todd, Kalamazoo, Mich., essential oils, menthol, etc.

What appears to be an oversight on the part of the exhibitors here is the absence of literature relating to the products manu-

factured and the extent of the industries represented. The chemical public is interested, not only in the products themselves, but in the history of the exhibiting firms and the development of chemical industry in various countries. For business reasons American manufacturers appear to be slow in answering even the ordinary questions which were supposed to be asked during the collection of statistics for the last census. A competent authority from the United States Census Bureau explained to me recently that, "data connected with the statistics of chemical industry in the United States are among the most difficult to procure." It is certain that there is not enough material available in Chicago to enable one to write a satisfactory description of the industry as it exists in America to-day.

Several of the exhibits in the above list are very instructive, but we would all like to know more than is shown, and this without inquiring into what may be termed trade secrets, which the manufacturer has a right to withhold from the public.

2. *England.*—American chemists are well aware that Great Britain has a chemical industry of vast proportions, and would naturally expect to find a corresponding exhibition at the Columbian Exposition. But the facts do not satisfy the anticipation, as there are but nine exhibits of chemical interest and only four of these are striking or suggestive. The exhibits to which attention should be called are :

Lewis Berger & Sons, London, colors for printers and painters.

Brunner, Mond & Co., Norwich, alkalies, bleaching powder, etc.

Doulton & Co., London, chemical stone-ware.

United Alkali Co., Liverpool, alkalies, salts, etc.

Brunner, Mond and Company are the largest operators of the ammonia-soda process in Great Britain and their industry has grown from a small beginning to the present large proportions where about one-third of the total alkali made in England is made by the Solvay process. Their exhibit includes caustic and carbonated alkalies, silicates, and a number of other products of excellent appearance. It is unfortunate that the exhibit, which is an interesting one, is not in the charge of a chemist capable of answering questions. Numerous visits to the collection have failed to find any one in charge.

The United Alkali Company is a combination of the leading manufacturers operating the Le Blanc and allied processes, and was formed in 1890 for "mutual protection" against ruinous competition among themselves and on the part of the ammonia-soda works.

This company claims to work, not as a trust, but as absolute owner of forty-five large chemical plants with railway lines, fleets of vessels, salt mines, stone quarries, etc. Their exhibit is attractive and will claim attention later for some details.

Manufacturers of chemicals on the large scale will be interested in the exhibit of stone-ware for factory work, made by Doulton and Company, of London. It includes various kinds of stone-ware employed in condensing or absorbing acid fumes, retorts, receivers, mixing pans, conducting pipes, acid cocks, acid pumps, and a great variety of small articles employed in chemical industry.

3. *France*.—The French exhibits arrived late and were greatly delayed in installation; at the present date no description of them appears in the official catalogue. There is, however, an official French catalogue on sale, which is badly arranged and is without a group index. According to this there are sixty-one exhibits of products which are classed under chemical and pharmaceutical industry, but some are either wanting or represented on a small scale, and others show perfumery, blacking, soaps, varnishes, etc., so that the number of chemical displays in the restricted sense amounts to seventeen. Those to which attention should be called are as follows:

Adrian et Cie., (Société Française de Produits Pharmaceutiques), Paris. General chemical products.

Buchet et Cie., (Pharmacie Centrale de France), Paris. General chemical and pharmaceutical products.

Hardy-Milori et Cie., Montreuil-sous-Bois. Organic and mineral pigments.

Société anonyme des matières colorantes et produits chimiques de Saint-Denis, (Poirrier), Paris. Organic coloring matters.

Société du traitement des quinquinas, Paris. Alkaloids.

Solvay et Cie. Varangé ville-Dombasle. Alkalies and salts.

Besides these there are several other exhibits of products from animal industry showing glues, gelatine, bone black, phosphorus,

etc., which are creditable. The several displays are arranged in a group of cases of similar design, forming a symmetrical whole.

4. *Germany*.—The representatives of German chemical industry began early to prepare an exhibit for the Columbian Exposition, and the results accomplished indicate that the matter was placed in good hands. The work of organizing an exhibit which should fitly represent the present condition of chemical industry in Germany was intrusted to a committee of nine prominent manufacturers, one from each of the eight sections of the German chemical trade union, and Dr. J. F. Holtz, of Berlin, as general chairman. To this committee eight other gentlemen were afterwards added and a study of the list shows that a selection of representative men was made. This committee concluded to make a collective exhibit and install it in a manner pleasing artistically as well as technically. The advice of an architect was sought and as a result the cases containing the collective exhibit were made, brought over and put up around a central pavilion, serving as an office, according to a design which is symmetrical and satisfactory from every standpoint. Seventy-one firms finally united in making the display, which was placed in charge of Mr. Richard Fischer, of Berlin, who represents the interests of all the exhibitors in a very fair and impartial manner, and at the same time does all in his power to assist the chemical public to an understanding of everything in his charge.

Very peculiar conditions exist to-day in the chemical industry of Germany which make such an exhibit possible. The manufacturers are united in a society which is termed the "Verein zur Wahrung der Interessen der chemischen Industrie Deutschlands" (society for the protection of the interests of German chemical industry) and which holds general meetings once a year. The organ of this society is the well known journal, *Die chemische Industrie*, edited by Dr. Emil Jacobsen, in Berlin, and this handles all questions of practical interest to the several industries united in the organization.

German chemical manufacturers are further united in a trade union (Berufs-Genossenschaft) which is rendered necessary by

the laws governing accident insurance to German workmen. This great union is, for convenience, grouped in eight sections geographically located as follows: (1) Berlin; (2) Breslau; (3) Hamburg; (4) Cologne; (5) Leipzig; (6) Mannheim; (7) Frankfurt a. M.; (8) Nuremberg. Chemical manufacturers are, therefore, so organized that co-operation in a display such as is made in Chicago is a thing easily secured, and the value of co-operation, for this purpose at any rate, is abundantly demonstrated by the success achieved in the installation of the collective exhibit.

Seven great branches of chemical industry are represented in Chicago and they may be divided as follows:

(a) Fundamental industries. Here we have the manufacture of strong acids, alkalis, and common chemicals in general employed by the soap maker, in the paper industry, in the glass industry, and elsewhere on the large scale.

(b) Pure chemical preparations for special purposes. Under this head appear the chemicals used in photography, in pharmacy, in laboratories as reagents or for purposes of investigation. The chemicals of this class are best known to American chemists, coming from the great houses of Schuchardt, Merck, Kahlbaum, Trommsdorff, De Haen, and others.

(c) Coal tar products, particularly the artificial coloring matters.

(d) Inorganic and organic pigments for the use of lithographers, printers, painters, porcelain glazers, etc.

These four groups belong to chemical industry proper. Then we have:

(e) Animal products, including especially glue, and gelatine for household and photographic uses.

(f) Fats, oils, soaps, and cosmetics.

(g) Chemical apparatus and accessories.

To show the extent of the exhibit a full list of the firms exhibiting in groups (a), (b), (c), (d), and (g) is here given.

Aktiengesellschaft für chemische Industrie, Mannheim, acids, alkalis, salts, etc.

Aktiengesellschaft für chemische Industrie, Schalke in Westphalia, acids, alkalis, general chemicals.

- Arsenic-Berg-und Hüttenwerk. "Reicher Trost," Reichenstein in Silesia, arsenic ores and preparations.
- Bernhardi, J., Leipzig, pharmaceutical preparations.
- Chemische Fabrik auf Aktien (vormals E. Schering, Berlin), pharmaceutical chemicals.
- Chemische Fabrik Bettenhausen, Marquart & Schulz. Bettenhausen near Cassel. technical and pharmaceutical chemicals.
- Chemische Fabrik Griessheim, Frankfurt, general chemicals.
- Chemische Fabrik, vormals Hofmann & Schötensack, Ludwigshafen. general chemicals.
- Chemische Fabrik Kalk, Cologne, Stassfurt salts, saltpeter, etc.
- Chinin Fabrik Braunschweig, Braunschweig, alkaloids, especially cinchonas.
- Farbenfabriken, vormals Friedrich Bayer & Co., Elberfeld, pharmaceutical chemicals.
- Goldschmidt, Th., Essen, tin and zinc salts, mordants.
- Dr. Graf & Co., Berlin, metallic paints, etc.
- Harrmann & Reimer, Holzminden. organic chemicals.
- E. de Haen, List vor Hannover, general chemicals.
- Dr. F. von Heyden's Nachfolger, Radebeul, organic pharmaceutical chemicals.
- Knoll & Co., Ludwigshafen, organic pharmaceutical chemicals.
- Köpp & Co, Oestrich, Rheingau, general chemicals.
- E. Merck, Darmstadt, general chemicals; also a large exhibit in special building.
- Rhodium. Gustav, Burgbrohl, inorganic chemicals.
- Riedel, J. D., Berlin, pharmaceutical chemicals.
- Dr. Schaeffer, Charlottenburg, anhydrous ammonia and salts.
- Dr. Schuchardt (Inhaber, Dr. Albert Weil), Görlitz, general chemical preparations.
- Stassfurter Chemische Fabrik, Stassfurt, Stassfurt salts, cyanides, etc.
- H. Thiemann, Jr., Stolp, general chemicals, amber.
- Verein Chemischer Fabriken, Mannheim, general chemicals.
- Vereinigte Fabriken, Zimmer & Co., Frankfurt and Feuerbach, alkaloid preparations.
- Wasmuth & Co., Ottensen, pharmaceutical preparations.
- Wassmuth & Co., Barmen, antiseptic preparations.
- Dr. Witte, Rostock, pharmaceutical chemicals.
- Gödecke & Co., Leipzig, essential oils and ethers.
- Heine & Co., Leipzig, essential oils and artificial products.
- Em. Kern, Edenkoben, cognac oils and tartars.
- Kölling & Schnitt, Zerbst, essential oils and essences.
- Brüder Richter, Leipzig, essential oils, menthol, etc.
- G. Bormann Nachfolger, Berlin, pigments for various purposes.
- Gademann & Co., Schweinfurt, a. M., mineral pigments.

Dr. Emil Jacobsen, Berlin, colors for artists and other purposes.
Kast & Ehinger, Stuttgart, printing and lithographing colors.
Bruno Lampel, Cologne-Ehrenfeld, mineral pigments.
Michel & Morell, Eppstein and Höchst, black pigments.
Moritz & Co., Hangenbieten, copying inks.
Johann Gottlieb Müller & Co., Stuttgart, colors for artists.
W. Rannefeld & Co., Blankenburg, mineral pigments.
Dr. Eugen Schall, Stuttgart-Feuerbach, lacquers for metals, etc.
G. Siegle & Co., Stuttgart, colors for printers and lithographers and for other purposes.
Vereinigte Ultramarinfabriken, Nuremberg, ultramarine.
Aktien Gesellschaft für Anilinfabrikation, Berlin, colors and colored samples.
Badische Anilin und Sodafabrik, Ludwigshafen, general chemicals and coloring matters.
Chemische Fabriken, vormals J. W. Weiler & Co., Cologne-Ehrenfeld, coal-tar products.
Rudolf Rütgers, Berlin, crude and purified coal tar products.
William Pearson & Co., Hamburg, antiseptic preparations.
Deutsch-Oesterreichische Mannesmannroehren Werke, Berlin, steel flasks for condensed gases.
W. C. Heraeus, Hanau, platinum ware for laboratory and industry.
Königlich Preussische Porzellan Manufaktur, Berlin, porcelain ware for laboratory and industry.
Tritschler, Winterhalder & Co., Voithenberghütte, laboratory apparatus of glass.

It will be observed that many of these firms are already well known in the United States, while others are making, perhaps, their first request for American recognition. As a whole, the collective display must be described as a success of the first magnitude, and deserving of the most careful study on the part of American chemists visiting Chicago.

I will make no attempt here to describe it in detail, but will leave that part of the discussion for a subsequent paper. I will only add that Mr. Fischer is supplied with literature which will answer almost every question which one may wish to ask about the chemical industry of Germany, and from which many of the points given above are derived.

5. *Russia*.—The extent of chemical industry in Russia is probably but little understood in the United States because of absence of trade and general lack of acquaintance with the language; however, five exhibits are shown in the Russian section which

indicate a fair condition of chemical activity. These are as follows:

- Brömme Brothers. St. Petersburg, organic chemicals.
- Technological Institute, St. Petersburg, general chemicals.
- Köhler & Co., Moscow, general chemicals.
- Oushkoff & Co., Moscow, general chemicals.
- Tentelewa Chemical Factory. St. Petersburg, general chemicals.

No literature is at hand showing the extent of the industries here represented.

(6) *Sweden* makes no exhibit of chemicals proper. The products of an acetic acid factory are shown and the Munktell filter paper is displayed by Sargent and Company, of Chicago, in the Swedish building.

(7) *Other Countries*.—Scattered through the various buildings are displays which in a certain sense have an interest for chemists. But practically everything belonging to chemical industry proper has been referred to in the above. It must also be mentioned that the official catalogues contain a great many mistakes, besides being silent as to displays from France, Russia, Spain, and other countries. It is in many cases difficult to find exhibits looked for.

Other Exhibits.—In the Manufactures building the German universities have united in showing a valuable collection of books, photographs, instruments, and preparations, all of the highest scientific interest and importance. Many pieces of apparatus shown are famous in the history of science, as with them original or fundamental determinations have been made.

Several of our leading American schools, notably Harvard, the Massachusetts Institute of Technology, the University of Pennsylvania, Johns Hopkins, Princeton, and Yale, have made displays highly interesting and valuable as showing the advance of scientific education in the United States.

In the Electricity building, besides the displays of electrical instruments and machinery of all kinds, there are two exhibits to which attention must be directed, as otherwise they may be overlooked because of their unfortunate location in the gallery. One is a collective display of physical and chemical apparatus

made by many of the leading German factories. Very interesting exhibits are made by the following:

Schmidt & Haensch, Berlin.

A. Krüss, Hamburg.

Karl Zeiss, Jena.

Steeg & Reuter, Hamburg.

Staudinger's successor, Giessen.

Bunge's successor, Hamburg.

Grossherzoglich saechsische Pruefungsanstalt für Glas Instrumente, Ilmenau.

The other important exhibit here is made by the Physikalisch-Technische Reichsanstalt, Charlottenburg, near Berlin, and consists of normal and standard instruments for various purposes, samples of material, diagrams, publications, etc., which are interesting to anyone acquainted with the work of the institution.

THE DEVELOPMENT AND EXTENT OF THE FERTILIZER INDUSTRY.¹

BY CHARLES U. SHEPARD, M. D., CHARLESTON, S. C.

THE fertilizer industry pre-eminently owes its origin to the scientific recognition of the indispensability of phosphoric acid as an element of plant food; its steady growth has reflected the agricultural appreciation of its use, while the stupendous strides in this branch of trade have especially followed the development of new phosphatic deposits, whose yield has furnished the basis of most artificial manures.

As powerful coadjutors in building up the fertilizer industry to its present dimensions, may be mentioned the development of the Stassfurt potash mines and the South American nitrate of soda beds, the utilization of pyrites (chiefly from Spain and Portugal), the Thomas slag from the steel works, ammonium sulphate, cotton-seed and other meals, and the valuable side products from the enormous slaughter houses of the present day. All of these agencies have contributed largely to the modern growth of the fertilizer industry; nevertheless a brief study of the history of the manufacture and trade in commercial manures

¹ Read before the World's Chemical Congress, August 25, 1893.