people, and especially the rising generation, are being taught the pecuniary value of food. The mass of the people do not realize the extent of waste now going on. It can be more fully brought to their attention when the pulpit seconds the press, and the preachers themselves learn the pecuniary value of food, and urge it upon those to whom they minister. When we are taught that it is sinful to waste, we shall be more apt to imitate the French, and have a greater variety of food, at less expense, with more leisure for the economical housewife.

Since 1865 the United States has led all other countries in the preservation of food in hermetically sealed tins. Every variety of soup, meat, fish, poultry, game, fruits, and vegetables is available at any season of the year.

The people are very rapidly learning "the pecuniary economy of such food" as compared with a like quantity of the same articles in a fresh condition. For instance: a one-pound can of the finest salmon in the world, packed on the Columbia River within a few hours of the time the fish is captured, costs the consumer 20 cents. He is thus enabled to secure nutrients at a cost of 55 cents per pound, which in fresh salmon at 35 cents per pound, as ordinarily obtained in city markets, would cost $1.40 per pound. Until recently this has been appreciated to a far greater extent in England than here. In this country, five years ago, there were consumed 16,000,000 tins of salmon. Since then each year has recorded a rapid increase in the quantity used, until last year 24,500,000 tins, or more than one-half the supply, were taken for home consumption. England is the chief buyer of American tinned meats, simply because consumers at home do not fully realize that a greater amount of nutriment for a given sum can be obtained in that way than from a like quantity of fresh meat at a far greater cost.

The waste of Southern cotton-fields is now being transformed into wholesome and cheap food, and destined, as W. Mattieu Williams believes, to take the place of lard as a frying-medium. We need not further specify in order to prove, that, as a people, we are making progress in the direction of checking waste, and that as population becomes more dense, time of less money-value, and the necessity for economy greater, we shall master the full meaning of 'the pecuniary value of food.' F. N. BARRETT.

ST. PETERSBURG LETTER.

RUSSIAN chemical literature has been enriched this winter by two considerable works, though of unequal value, — Mendeleef's work on solutions, and Menschutkin's 'Essay on the Development of Chemical Theories.' In the former book the celebrated Russian chemist gives a considerable account of his own work, together with a clear exposition of the views of other chemists. I cannot attempt to analyze it here, but mention only that he formulates some simple laws in this matter, which will undoubtedly be accepted by the scientific world. Menschutkin's book leads us from the phlogiston theory to the views of the present generation of chemists. The last chapters are the best. The author has for some years been engaged in the arduous task of measuring the time and other conditions of chemical re-actions. The second edition of Beilstein's 'Handbuch der Chemie,' published, like the first, at Leipzig, is rapidly advancing. Though rather a compilation, it is an exceedingly useful book, and it is scarcely credible that it should be the labor of one man. The author has been for more than twenty years professor of chemistry, and director of the chemical laboratory of the Technological Institute at St. Petersburg.

Professor Mendeleef received a short time ago an official mission to the Donetz coal-basin. The mine-owners petitioned for it, representing that his work on the petroleum question proved him to be equally competent in the scientific and economic aspect of it.

Russia has to deplore the early death of a man who has already done much for science, and could be expected to do more, — the zoölogist M. Bogdanow, professor of zoölogy at the University of St. Petersburg. Born in 1841, educated at the Kazan University, where he finished his studies in 1864, he came to St. Petersburg in 1871, and remained professor till his death, March 16, 1888. Mammals and birds, and their geographical distribution, were his principal studies, especially the latter. His two greatest works are, 'The Birds of the Caucasus,' published in 1885; and 'Russian Ornithology,' the first part of which appeared in 1885. He travelled extensively, especially in eastern Russia, the Caucasus, and to Khiva and the surrounding deserts, and gave some of the best descriptions of these countries to be found anywhere. For some years he was very much interested in economic zoölogy, especially in the breeding of domestic birds. As professor he was exceedingly popular, and some of his pupils have already done good work.

The results of the past 'geographical campaign' were not brilliant, as no first-class geographical expedition was in the field. It is to be hoped the current year may give more. General Prejevalsky is here, and hopes to start again for Tibet in August or September, 1888, to equip the expedition, buy camels at Karakol, near Lake Issyk-Keel, and then go via eastern Turkestan. A money-grant from the government will certainly not be refused for his expedition, on account of the high scientific character and political importance of the former.

He has brought with him the manuscript of the narrative of his fourth journey, which is soon to be published. As to the special reports on botany, zoölogy, etc., they are in the hands of specialists, and some of them will take considerable time.

Potanin is now at Irkutsk, having accepted the position of secretary of the East Siberian branch of the Russian Geographical Society. He is occupied in writing the report of his last extensive journey to western China, Mongolia, etc., and is not likely to start very soon on a new expedition.

As to the work of the Russian Polar Commission, the report on terrestrial magnetism at Sagastyr, at the mouth of the Lena, will soon be issued, while the additional observations will not be issued until some years later. The reason is, Lieutenant Jurgens has been ordered to embark for Vladivostok, and will have no time for the discussion of the Sagastyr observations for two or three years.

The council of the Imperial Russian Geographical Society have decided to grant money for the fall expedition in 1888: Kousnezow to the northern Caucasus, Kossikow to the south-western Caucasus. Both will study the glaciers. The latter goes principally for studies on mammals and birds. Adrianow will go to the Altai, Colonel Grombtschewsky to the Pamir, Listow to the Crimea, where he did good work in 1887. An expedition which is not entirely decided upon is that of the astronomer Baklund, and geologist Kudriawtsew to the Kola Peninsula. The geologist Iwanow, well known for his explorations of the Pamir, is to start in a few days for Vladivostok, for a two-years' exploration of the vicinity, the Sichota-Alin Mountains, and southern part of the Ussuri basin, the principal aim being the discovery and exploration of coal-mines.

The Meteorological Commission of the Geographical Society is doing good work, and now organizing some stations which will make observations which may be useful to agriculture; viz., actinometric, and on the temperature of the soil from the surface to a depth of two metres. The most interesting of these stations is that proposed at Sultan-Bend, on the Murghab River, south of Merv, where a great dam is to be built across the river, and the water retained to irrigate 300,000 hectares of the most fertile land. Extensive cotton-culture is contemplated on the land thus redeemed from barrenness, as in that country no culture is possible without artificial irrigation.

The depression of agriculture and low prices are the topic of the day, and often discussed in more or less learned societies; but it would be difficult to give a brief account of them, and most of the discussion is of no scientific value.

The season from January to the middle of March has been a rigorous one also in the north of Russia. The frosts were remarkable for their persistency more than for their rigor. From the 7th of January to the 22d of March there was no thaw at St. Petersburg, yet the air-temperature did not sink below —29° C. It fell much lower in February, 1867 (—33.5°); January, 1868 (—38.0°); February, 1871 (—36.3°); and December, 1876 (—37.6°). It sank below —30° even in March, 1867 and 1877.[1] For many days in January, February, and March the coldest region was southern and central Finland, the cyclones passing south of it. Thus in the north we did not have the fearful snow-storms which were experienced nearer to the centre of the cyclones in central and southern

[1] In all these cases not the minimum temperature, but the lowest of those observed by observations made thrice a day, are given.

Russia as well as in Germany, where traffic was blocked for many days. Now it is often stopped on account of the melting of the enormous amount of snow accumulated in winter. Destructive floods have already begun, especially in Hungary and Galicia, and will extend northward and eastward as the season advances.

O. E.

St. Petersburg, April 2.

SCIENTIFIC NEWS IN WASHINGTON.

Manual Training in the Washington Public Schools. — Dr. Sternberg's Investigations in Regard to the Yellow-Fever Micro-Organisms. — Production of Copper, Lead, and Zinc.

Manual Training in Washington.

A YEAR ago Congress appropriated five thousand dollars to be used during the present fiscal year for the experimental introduction of manual training into the public schools of Washington, in accordance with a plan outlined by Prof. W. B. Powell, superintendent of schools of the District of Columbia. Industrial drawing had been introduced into the schools six or eight years ago. Beginning with moulding in clay and stick-laying and the study of the forms represented, the pupil is advanced, during the eight years of the course below the High School, to constructive drawing, free-hand and instrumental; to making working drawings of the hollow cylinder, of the bolt-head, of the bell, of the pulley, of the try-square, and of framing (the mortise and tenon); to the making of conventional ornaments, drawing plant-forms from nature and adapting them to ornament, etc. Professor Powell's plan was to supplement this by making work in shops a part of the regular course for the boys in the two higher grades of the grammar-schools and in the High School, and in the same way to ingraft instruction for the girls in cookery, upon the same grades.

With the funds provided by Congress there were fitted up, at the beginning of the present school-year, two schools of cookery, four schools of carpentry, one school of turning, moulding, and forging, and one school of sewing. The cost of furnishing and equipping each school of cookery with chairs, table, washstand, cupboard, dishes, range, boiler, and fittings, was $202.20; that of each school of carpentry, for benches, tools, lumber, and nails, a little less than $400; and that of the school of turning, moulding, and forging, including moulding tools, forges, lathes, and tools for same, shafting, belting, pulleys, and fittings, and steam-engine, $1,800.29. The estimated cost of materials for all of these schools for the current school-year, the estimate being based upon the actual expenditure to Jan. 1, is $631.53. Eight teachers are employed, — two of cookery at $500 a year each; four of carpentry and one of turning, etc., at $650; and one of sewing at $700. The teachers of carpentry, turning, and forging are all graduates of the Worcester (Mass.) Polytechnic Institute, specially trained to give this kind of instruction; and the teachers of cookery are graduates of the Washington Normal School, who have taken a special course in cookery under the supervision of Superintendent Powell.

The number of pupils now under instruction, drawn from the seventh and eighth grades of the grammar-schools and from the High School, is as follows: in the schools of cookery, 471; in the schools of carpentry, 660; in the school of moulding, turning, and forging, 112; in the school of sewing, 600. These schools, except the sewing-school, the instruction in which is given in the regular classrooms, are divided into classes of about twelve pupils each, which succeed each other during each school-day at intervals of one hour each. Every class, therefore, has one hour's instruction in the shops each week. It is Superintendent Powell's desire to increase this to two hours a week as soon as sufficient funds are available, and shops have been provided for all the pupils in the grades mentioned. In the cooking-schools, each lesson consists of instruction in the chemistry of foods and cooking, in the relative nutrient qualities of different articles, in the selection of food at the markets and the groceries, and in the practical preparation of one dish. During the week intervening between the lessons, the pupils are requested to make a trial of the dish last made, and to report success or failure.

The interest of the pupils in this work is very great. The teachers have been surprised to find how many of the girls in the two higher grades of the grammar-schools and in the High School are entirely ignorant of even the plainest cooking. This is true not only of the daughters of wealthy parents, but of those of families of small income, like clerks in the government departments. In a large majority of cases no instruction at home seems to have been given the girls in the public schools. Again: the more wealthy parents are, as a rule, the more anxious that their daughters shall join the classes in cookery. Some of the pupils at first objected to washing the dishes and making the kitchen ready for the next class, but this false pride has already disappeared. A healthy emulation has sprung up among the girls of each class to be able to report the most successful experiments in cookery at home; and in many a family in Washington an improvement in the methods of preparing food has already taken place, as a result of the few months' instruction that has already been given.

The schools of carpentry are also divided into classes of twelve pupils each, and the course comprises two years' instruction. During the first year the boys in the seventh and eighth grades of the grammar-schools are practically taught the correct methods of using planes, handsaws, chisels, gouges, brace and bits, hammer, gauge, and other tools in the working of wood; the laying-out of work with knife and pencil, using try-square, bevel, and dividers, and working from drawings executed by the pupil himself; the making of plain and more complex mortise-and-tenon joints; dove-tailing and plain cabinet-making; the making of articles of practical utility for the schools and shops; the putting-together of work with brads, nails, screws, and glue; the care and sharpening of edged tools; and the use of circular saws.

A visit to the schools of this grade showed wonderful progress during the few months since they were established, and this progress was especially striking when some of the earlier work was compared with some of the later. In one of these schools, each pupil was engaged in making a shoe-blacking box. The designs were all original, and no two of them were alike. Some of them showed considerable invention in the form and arrangement of the boxes. Working-plans had first been made, and submitted to the teacher for his approval, and every pupil was required to construct his box in accordance with the plans submitted. The work was well advanced when seen; and some of it would have been highly creditable to a skilled cabinet-maker, while the average of it all was certainly as high as that which would be done by the average Washington mechanic. Benches for use in the shops, shelves and cupboards for the use of the schools, geometrical blocks for the primary schools, and many other articles, had already been made by the classes of this grade.

In the turning, moulding, and forging shop the boys from the eighth grade of the grammar-schools and from the High School are taught the use of all the hand wood-turning tools, embracing plain and fancy turning in hard and soft wood, inside and outside; the use of chucks and face plates; pattern-turning; bench-moulding in sand; casting soft metal, embracing the use of slickers, trowels, riddle, etc., using patterns made by the pupil himself; the forging of small articles of soft iron and steel, and steel tools, with instruction in the simpler methods of manufacture of iron and steel; practice in welding iron and in hardening and tempering steel, and by lectures on metallurgy.

It is the intention to give each class two hours of practical instruction a week; but, owing to the small number of shops and the limited number of teachers, they are receiving but one hour a week this year. But their progress has been very satisfactory. The work in turning, moulding, and forging, while showing great differences of adaptability on the part of the pupils, proves that every boy is capable of learning to use common tools, and of making with them a thousand and one articles which, before the few lessons he has received, he would not dream of undertaking. Among the useful articles already made in this shop are a set of filter-stands for the physical laboratory of the High School, handles for tools, etc.

The interest of the boys in the work of the shops is as great as that of the girls in cookery. They are all bright, wide awake, and there is no listlessness, no idling the time away. As all the members of each class are engaged upon similar work, there is a healthy emulation among them to produce the best results. It is also noticeable that the wealthier parents take more interest in these