

grasp their meaning when starting from his point of view.

It being, of course, admitted that chemistry should be so taught as to have its principles firmly retained by the student, the instructor should endeavor to place himself in the student's position and strive to see things from his standpoint. It is immaterial how scientific the arrangement of the course may be if such arrangement does not follow the mental drift of the average learner and appeal to his sense of general fitness. It is for that reason that I cannot sympathize with a separation of the oxides of arsenic by an interval of seventy-five pages from the other compounds of the same element, as is done in one of our best text-books. Such separation may suit the views of the distinguished author and his brother chemists, but the book is not written for them; it is intended for the use of beginners, and beginners do not look at the subject in that apparently disjointed way.

Another difficulty with many of our text-books is that they are much too full during the early portions of the course. They deal with expansions of, and exceptions to, topics at a period when the topics themselves are fraught with entirely new ideas to the student.

Take, for instance, the question of 'valency.' If my experience goes for anything, it is better to allow the beginner to conceive valency as a definite constant for each element, and then at a later stage, after considerable experience with things chemical has been acquired, the subject may be brought up again and more extensively discussed.

Again, let us suppose that the student is at work upon the subject of 'Phosphorus.' Almost the first fact he learns is that phosphorus is attacked by oxygen with exceeding readiness, and that an oxide of the element results.

Is it wise, therefore, to insert in the text that 'phosphorus is incapable of uniting with oxygen if the gas be perfectly pure and free from aqueous vapor?' Would it not be better to allow the beginner to become as familiar as possible with the chemistry of ordinary conditions before venturing into those dimly lighted regions where 'chemical purity,' 'perfect dryness,' 'exceeding heat' or 'exceeding cold' are the disturbing factors?

The student tends to hold the instructor responsible for all irregularities in the science, and, as a beginner, he resents ambiguity. Exceptions and amendatory comments both confuse and discourage him. The time comes later on when to note the peculiar character of this substance, or the exceptional behavior of that, may be of real interest to him; but the establishment of such an interest is a matter of slow development, and care should be taken during the early stages of instruction that great masses of heterogeneous facts be not so piled together as to cause no growth at all.

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*PROFESSOR SCHENCK'S RESEARCHES ON THE
PREDETERMINATION OF SEX.**

IN view of the fact that Professor Schenck's conclusions as to the power of artificially determining the sex of offspring have served as a nine-days' wonder to some of the lay papers, it seems advisable to lay before our readers a plain statement of his argument, taken without comment from the pamphlet which he has just published.† It opens with the statement that it is impossible to command natural processes, but possible by scientific means to exercise a

* From *The British Medical Journal*.

† *Einfluss auf das Geschlechtsverhältnis*. Von Dr. Leopold Schenck, Professor an der k.k. Universität und Vorstand des Institutes für Embryologie in Wien. Magdeburg: Schallehn and Wollbrück. 1898.

more or less effectual influence upon them, in order to extract from them the best possible results. His essay falls into three parts—a summary of the writings of his predecessors, an account of his own researches and deductions, and finally a description of the method of treatment he has devised, with illustrative cases.

In the development of an embryo the generative organs are at first indifferent—hermaphrodite; in the further process of growth one set develops while the other atrophies. This tendency must be predetermined from the time of fertilization, for each cell formed from the ovum must have sexual characters, since these are not confined to the generative organs, but appertain to the whole body. The readiness with which an ovum can be fertilized depends upon its position in the ovary, the thickness of its envelope, etc., and these may also have a bearing on the question of sex. In other words, the predetermination may precede fertilization, and of this confirmation is found in the development of bees and in the production of male and female flowers by plants under different nutritive conditions. In this connection Professor Schenck enunciates and discusses at considerable length the views of previous writers. He points out that the male sex preponderates to a definite though slight degree in the total number of births, and that the sex of a child is more likely to be that of its older parent. He pays particular attention to the theory of crossed sexual heredity, by which each sex tends to propagate the other. Thus if the sexual power of the male be greater a female offspring is more likely to result, and *vice versa*. This theory is threshed out most thoroughly and with abundance of quotations and examples; in the end Professor Schenck practically accepts it, and makes use of it in his further work. With regard to the influence of environment upon sex, he quotes Robin's

statement that in warm climates females preponderate, in cold and unfavorable, males. Born also showed that 95 per cent. of artificially fertilized frog's eggs hatched out as females, this being an effect of nutritive conditions acting after fertilization. Thury's researches are fully analyzed, and are stated to have originally called Professor Schenck's attention to the subject. Thury found that cattle fertilized at the beginning of 'heat' threw more females, at the end more males. This he explained by the degree of ripeness of the ovum, but Professor Schenck accounts for it on the crossed inheritance theory, the sexual power of the female being at its greatest at the end of the period of rut. This part of the work is summed up in the statement that the sex of offspring largely depends upon the state of nutrition of the parents, particularly that of the mother during pregnancy. During this period the difference between intake and excretion represents the food of the embryo, and hence requires special attention. The temperature is slightly raised owing to oxidation processes, which entail a considerable consumption of red blood corpuscles and consequent diminution of hæmoglobin.

The second section begins with the enunciation of the fact observed in domestic animals and in insects that the better the mother is nourished the more females she produces, the number of males remaining practically constant. This influence upon the foetus *in utero* has received but little attention from the practical point of view, and Professor Schenck consequently set out upon a series of observations based on the theory of crossed sexual inheritance. He first investigated the excreta, and particularly the carbohydrates of the urine. The presence of a certain amount of sugar, which is commonly recognizable by the phenyl-hydrazine test in perfectly normal individuals, indicates incompleteness of the oxidation pro-

cesses, whereby a certain quantity of heat is lost to the body. This physiological output of carbohydrate is in the male sex most marked during the period of growth—that is, between the ages of 14 and 19. In women there is no corresponding increase, but small quantities may appear in the urine before and after menstruation, while Iwanoff and others have shown that glycosuria is common in pregnant and parturient women. Now the amount of sugar normally excreted is equal in men and women, but more significant in the latter owing to the lesser activity of their metabolic processes. For the perfect ripening of the ovum it is necessary that oxidation shall be perfect—that is, that no sugar shall be left unburnt. Where there is a remainder of unburnt sugar the ovum stands a chance of being less ripe, and less well nourished. Hence the properties of its protoplasm are less well developed, and by the theory of crossed inheritance it is more likely to produce a female child. On the other hand, when the urine is free from sugar the ovum can attain perfect development, and give rise to male offspring. It is upon this cardinal principle that Professor Schenck's theory is based. He holds that a prolonged course of appropriate nourishment both before and after fertilization will tend to the conception of male children only.

The next question is of the means to be adopted to ensure this end. If a male child is desired, and the maternal urine contains no sugar, but abundance of reducing substances (particularly the lævo-rotatory glycuronic acid), he allows impregnation forthwith. If, on the other hand, sugar is present it must be removed, and the reducing substances increased before fecundation may take place. It is found that the urine of a woman pregnant with a boy contains more reducing substances than that of one with a girl. We need not enter into the de-

tails of the diet recommended, beyond saying that it contains much proteid, which seems to be required by a male embryo.

Finally Professor Schenck gives what may be called his clinical results. He quotes numerous cases to show that the bearing of female children is associated with glycosuria. In such instances he recommends a diet comprising plenty of proteid and fat, and as little carbohydrate as can be tolerated; this must be taken for two or three months before and three months after impregnation. He gives one example in which six boys were born in succession under this treatment, and a girl immediately it was relaxed; and others in which boys were born after repeated births of girls before the treatment. In all, out of seven recorded cases, six were successful. He concludes that the nutrition of the mother plays a most important part in the determination of sex, and that in countries where much flesh is consumed there is a marked preponderance of male children. This can be imitated artificially, but it is far more important to ensure the completeness of oxidation processes in the body. As long as the combustion of the food is perfect, and the urine is totally free from sugar, the exact amount of meat consumed is of secondary importance. The birth of male children can thus, in certain cases, be predetermined, but the voluntary production of girls is a problem as yet unsolved.

CONVERSAZIONE OF THE ROYAL SOCIETY.

THE first of the annual *conversazioni* of the Royal Society was held on May 11th, in the Society's rooms at Burlington-house, the guests being received by the President, Lord Lister.

The London *Times* states that there was the usual exhibition of objects, apparatus, processes, and experiments illustrative of some of the most recent advances in scien-