

not get any reference to their presence in any of the previous literature'. Owen refers to these apertures in his *Comparative Anatomy of Vertebrates*, Vol. I, 1886. He mentions, speaking of the vertebræ of Ophidia, at page 53 of the book, that 'a vascular canal perforates the under surface of the centrum and there are sometimes two or even three smaller foramina.' Mookerjee's

observations confirm Owen's statement for Typhlopidae.

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[Mr. L. S. Ramaswami of Bangalore has, in a communication sent to us, drawn our attention to the same reference.—ED., *Cur. Sci.*]

### Research Notes.

#### Silicosis.

SILICOSIS is mainly a lung disease counting a high toll among the gold miners, sand blasters and quarry-men. Silica enters the lungs in large amounts as fine dust particles causing there the development of fibrotic nodules extending, in course of time from the midline to the periphery, inducing in men a pre-disposition to tuberculosis. A review of the theories on silicosis along with the rôle of silica in the system is presented by Dr. King (*Canadian Chem. and Metallurgy*, 17, 146, 1933). According to Hefferman, silica gets embedded as the hydrosol in the phagocytes which become consequently vacuolated and die, the process spreading from cell to cell. The mechanism of this dehydration is not adequately studied. Policard considers a mineral impregnation to take place resulting in a sort of mummification of the protoplasm. According to King the silica content of the urine is influenced by the nature of the diet being larger when animals are fed with oats, cabbages, etc., and smaller on a diet of white bread and tomato juice. Silica is present as an invariable constituent of the protoplasm in the white and yolk of the eggs of birds, and other embryonic mammals. Direct administration of silica as finely powdered quartz into the stomach results in an enhanced output of this material in the urine. This value is still more abnormal when it is employed as neutralised sodium silicate. Silicic acid in saline, in dilute solutions, when given intravenous continuously for several hours, produces very high values in the urine. When this is, however, replaced by a fine suspension of particulate silica, much of this constituent is not detected in urine, but the urine becomes bloody resulting in anuria followed by death. The kidney had, however, a normal silica content while the

spleen had a figure far above the normal. Organic derivatives of silicic acid affected the composition of the blood and urine without evil effects, suggesting a high tolerance of silica in this form. The author finally concludes that the increased output of silica is not apparently through the kidneys.

#### Corrosion of Tin and Iron.

CORROSION of tin and iron in tin cans used as containers for acid foods such as fruits is the theme of a contribution by Lipsett (*Canadian Chemistry and Metallurgy*, 17, 171, 1933). In tin cans the iron is protected by a coating of relatively inactive metals such as tin, but where this coating has worn out, corrosion sets in causing pinholes. The occurrence of these spots in tin containers is explained as due to electrochemical action, the dissolution of iron at the anode taking place consequent on the evolution of hydrogen at the cathode and in view of the limited exposure of iron, the attack is strong resulting in the formation of a deep hole. Thus one would conclude that tin cans do not serve as ideal containers. The observed facts are quite contrary to our expectations for which an explanation has been sought in this communication. The coating of tin has a protective action on the exposed pinholes but the element that seems to suffer due to corrosion is tin itself. It is common nowadays to use enamelled tin cans to preserve coloured fruits, since their colour is bleached badly in these containers. Strangely enough, such decolorisation is hastened in the well lacquered holders. A third anomaly is traceable to increased acid content of the fruits whereby less damage is caused to the tin, in striking contrast to the general view that corrosion is accelerated by increased acidity. Explaining the first

of these anomalies the author draws attention to the fact that when tin and iron are held in electrical contact in an acid solution, the amount of tin dissolved is far greater than it would otherwise be, while under the same conditions iron behaves in exactly the opposite way. The electric potential between the tin and the iron is reversed and the iron is cathodic to the tin. The tin-iron couple, under anærobic conditions, behaves in a manner wherein the hydrogen liberated through the action of acid on tin protects the iron from being acted upon. Potential measurements carried out by the author confirm these practical observations. Coming to the products of corrosion, it is found that a very large part of the tin dissolved is in the insoluble state. It is also found that hydrogen accumulates in the sealed tins after utilising the oxygen of the air originally contained therein. The contents may be good to eat being sterile but the gas accumulation causes the cans to swell. The increased corrosion in the case of lacquered containers is not due to the action of acids on the lacquer, but to defective make up of the holders. In practice, tin sheets are lacquered before stamping out the ends, with the result that weak spots and abrasions are created in the process of stamping, in both the lacquer and tinned plate itself. It is then easy to understand the causation of leaks, especially at the ends occurring chiefly in the countersink. The tin here does not protect the iron, since the surfaces of tin and iron exposed to the acid are more or less the same. Whether the lacquer film favours this heavy corrosion is a point for further confirmation. It is hoped that this physico-chemical aspect will receive due attention in the several problems relating to food and food containers in whatever manner these are used.

#### V. I.

#### Some Factors affecting the Electrolytes of the Starch Granules.

THE starch granule is generally regarded as consisting of two parts,  $\alpha$ -amylose or amylopectin forming the outer insoluble layer and  $\beta$ -amylose constituting the soluble inner part. The amylopectin fraction contains phosphorus and the fact that dephosphorisation considerably decreases the viscous properties of the materials which is restored by rephosphorisation suggests that phosphorus profoundly influences the viscosity

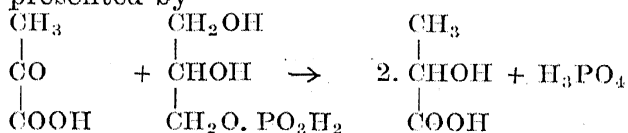
of starch. Other electrolytes have been detected in starch granules from various sources (some of them may be regarded as adsorbed impurities) and the relationship between them and the viscosity of starch is not well understood. The problem is one of great practical importance as starch is extensively employed in arts and industries. In a paper published in the *Journal of Agricultural Research* (47, 179-91, 1933) Edwards and Ripperton have reported their findings regarding the variation of phosphoric acid and cations in starches of various origins, the nature of their binding and the possible significance of the results in practical industrial uses of starch and plant physiology. Analysis of a large number of commercial starches showed that phosphate was always present and gave characteristic values. The other constituents, calcium, magnesium, etc., varied within very wide limits. In the case of edible canna root-stocks it was shown that the observed drop in viscosity was correlated with the decrease in potassium and increase in calcium. This was not, however, true of stored potatoes. *In vivo* studies of the relationship between electrolytes in sap and the electrolytes associated with starch showed that there was no direct chemical equilibrium between the two. The conclusion that ionic absorption is specific and is not controlled by the electrolyte-concentration of the sap appears to be justified. Starch may function as a store for inorganic materials which the plant can utilise when needed. During germination, for instance, the phosphorus associated with starch is made available possibly in organic combination needed for early growth.

#### Intermediate Products and the Last Stages of Carbohydrate Breakdown in the Metabolism of Muscle and in Alcoholic Fermentation.

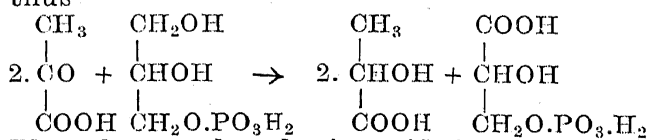
IN the course of a lecture delivered in the Biochemical Laboratory, Cambridge (Reported in *Nature*, 132, 337-340; 373-375, 1933) Dr. Otto Meyerhoff has summarised the present status of our knowledge concerning the anærobic carbohydrate breakdown in lactic acid formation in muscle and in alcoholic fermentation. Esterification of the phosphates has been generally regarded as the first step in these processes. The stages following esterification, however, have

formed the subject of several important investigations.

From the living yeast and other intact cells and tissues as also from the muscle extract it is possible to isolate a hexose monophosphoric acid ester, which is actually a true equilibrium mixture consisting of about 70% aldose monophosphoric acid and 30% ketose monophosphoric acid. Embden observed that the addition of sodium fluoride inhibited the formation of lactic acid in muscles, at the same time producing increased quantities of hexose diphosphoric acid. Subsequent work of Lohmann (1930) showed that this acid was a rearrangement product of the ester isolated by Harden and Young, from yeast-press juice. Under conditions defined by Lohmann, glyceric acid monophosphoric acid (phospho-glyceric acid) is also produced and treatment of phosphoglyceric acid with minced muscle produced pyruvic acid, and  $\alpha$ -glycero-phosphoric acid (a reduction product). Embden further observed, that simultaneous addition of phosphoglyceric acid and  $\alpha$ -glycero-phosphoric acid to muscle tissue caused an increased formation of lactic acid twice as much lactic acid being produced as pyruvic acid disappeared, while neither pyruvic acid alone nor  $\alpha$ -glycero-phosphoric acid was able to produce lactic acid when added to carbohydrate-free muscle extract. Thus the reaction is represented by—



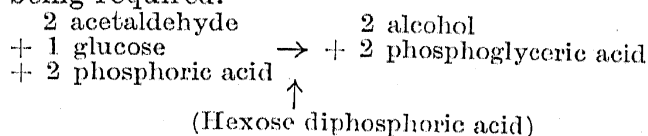
The inhibiting effect of sodium fluoride in lactic acid production from carbohydrates is due to the inhibition of that stage of the reaction responsible for the splitting off of phosphoric acid from phosphoglyceric acid. If, therefore, excess of pyruvic acid and  $\alpha$ -glycero-phosphoric acid be added to muscle extract, as also enough fluoride to stop completely the anærobic breakdown of glycogen and hexose diphosphate, lactic acid is formed, and in the same amount as would be produced without the addition of fluoride; but the disappearance of pyruvic acid and formation of lactic acid are equivalent; thus—



The glycero-phosphoric acid is completely converted into phosphoglyceric acid.

The pyruvic acid and glycero-phosphoric acid do not react with each other directly to produce lactic acid, but one half is converted into triosephosphate which then undergoes rearrangement. The glycero-phosphoric acid thus produced can react again with pyruvic acid but the phosphate group of phosphoglyceric acid is not split off.

Considering the alcoholic fermentation, it has been observed that when phosphoglyceric acid is added to fresh yeast extract,  $\text{CO}_2$ , phosphoric acid, and acetaldehyde are produced. Again, when hexose diphosphoric acid is added to a fluoride containing yeast juice, the ester undergoes change and a mixture of phosphoglyceric acid and glycero-phosphoric acid in equal quantities is produced. Glucose alone is not esterified in the presence of fluoride, but the esterification takes place when glucose and diphosphate are simultaneously added to yeast juice, but the reaction stops when the quantity esterified is equal to the hexose diphosphate. Addition of acetaldehyde brings about other interesting changes. The reaction proceeds further, aldehyde is reduced to alcohol, the sugar is esterified, and converted into phosphoglyceric acid. The extent of the reaction depends on the amount of added acetaldehyde only a trace of hexose diphosphate which acts like a true catalyst being required.



Acetaldehyde can be replaced by other reducible systems such as methylene blue. The mechanism of the reaction appears to consist of a reaction between the aldehyde and the nascent triose-phosphoric acid produced from the reaction between glucose and hexose diphosphate. The aldehyde also prevents the rearrangement of the triose-phosphoric acid into glycero-phosphoric acid so that the triose-phosphoric acid is quantitatively converted into phosphoglyceric acid.

“The difference between alcoholic fermentation and lactic acid fermentation is to be found in the fate of pyruvic acid while pyruvic acid in muscle extract is reduced to lactic acid by the glycero-phosphoric acid, in yeast, it is split up into  $\text{CO}_2$ , acetaldehyde which acetaldehyde is then reduced. This reduction is not accomplished by the glycero-phosphoric acid, but by some precursor probably the glyceric aldehyde phosphoric acid.”

### On the Placentation of the Harbor Porpoise (*Phocaena phocaena*, Linn.).

G. B. WISLOCKI in an important article (*Biol. Bul.*, Vol. 65, Aug. 1933) describes the placentation of Porpoise. The existing literature on this subject is very scanty. The fetus which is almost a fully grown one occupies more commonly the left uterine cornu and the foetal envelopes extend into the right cornu also. But in this case, the amnion though larger than the allantois does not extend into the right cornu. The placenta is of the diffuse epitheliochorial type. Where the blood vessels are greater in number the attachment is also intense and *vice versa*. Further the characteristic features of the diffuse placenta, the presence of chorionic vesicles, are wanting. A sectional view of the umbilical cord shows the presence of vascularised stroma, resembling therefore the ungulates more than the primates. Prof. Wislocki assures us that in a future communication a detailed description of the umbilical cord, the stroma and the lymphatics will be made.

### Cytology of Meiotic Cells in Schizodactylus.

C. E. MCCLUNG AND J. J. ASANA (*Journ. Morph.*, 55, No. 1) report an interesting case of a cytological condition of the meiotic cells in Schizodactylus, an aberrant Orthopterous insect. The work of McClung and his students has established a fact that the chromosomes in this group of insects conformed to a certain type in their structure and behaviour. Obviously the case of Schizodactylus is an exception, for in certain important respects it differs from this type. Firstly, the chromosome number is astonishingly small, in fact the smallest in all Orthoptera, being only fourteen in the diploid condition. A second fact of importance is the evenness in number indicating the presence of a Y-chromosome unknown in the group except for some *Grylotalpa* individuals. Another important feature in which Schizodactylus differs from other Orthopterous insects is the distinctive characteristics which make the identification of the different tetrads very easy. The fiber attachment is terminal though the larger chromosomes in the metaphase are J-shaped. The relatively small size of the chromosomes in the first spermatocyte is another interesting feature. In fact the authors think that in many respects the condition in Schizodactylus recalls that in Chilopods described by

Bouin and Blackman. The position of Schizodactylus in the group Orthoptera on the basis of anatomical characters is not clear. And the behaviour and structure of the chromosomes in this animal lend additional proof for the anomalous position of this animal.

### Variations in the Oestrous Cycle of Guinea-Pig.

USING the vaginal smear technique, Thomas Nicol (*Proc. Roy. Soc., Edin.*, 53, Pt. 3) has given excellent data for the determination of the variations in the oestrous cycle of the guinea-pig in the virgin animal, after parturition and during pregnancy. The duration of the normal oestrous cycle is about 16 to 18 days, though variations between 10 and 26 days have been recorded. Normally the vagina is closed by a thin membrane and during the period of sexual activity the orifice is kept open for about three or four days, afterwards closing again. During this period of heat the vagina is filled with a fluid which has been subjected to microscopical examination in different stages of this sexual activity. And on the basis of the vaginal smear preparations the oestrous period has been divided into four stages extending over a total period of 12 to 24 hours, ovulation occurring about the middle of this period. Observations on 368 cycles from 40 animals have yielded uniform results.

### African and American Explorations.

IN the *Proceedings of the Academy of Natural Sciences of Philadelphia*, Vol. LXXXIV, for 1932, a series of articles based on the explorations into the various regions of Africa and America is reported. Besides descriptions of the African birds, the Herpetological and Avian fauna from Honduras and Fishes from Brazil, a new species of Sailfish, *Istiophorus, I. brookei*, is described from Tahiti. The account on the Reptiles and Amphibians from Honduras deals with seventeen Amphibians and twenty-six Reptiles. The ecological adaptations of the fauna at an altitude of nearly 5,000 feet, must be extremely interesting and we expect an account of this in the next issue of the *Proceedings*.

### Origin and Classification of Pegmatites.

IN a recent number of the *Amer. Miner*, 18, pp. 33-56 and 95-103, 1933, K. K. Landes

has published an interesting paper on the origin and classification of pegmatites. All theories of pegmatite origin are classified into two groups—aqueous and igneous—and further sub-divisions in each group are mentioned and discussed, especially the 'hydrothermal replacement sub-groups'. Examples of the various types of pegmatites included in the classification are given.

#### Contamination in Acid Magmas.

EVER since petrology, as distinct from petrography, came into its own, the rôle played by assimilation in the formation of igneous rocks has been the subject of repeated controversy. An interesting paper on 'Some theoretical aspects of contamination in acid magmas' by S. R. Nockolds appears in a recent number of the *Journal of Geology*, 41, No. 6, wherein an attempt has been made to show what happens when foreign material is added to an acid magma and the various ways in which this material is incorporated. The author has definitely shown that "from

a theoretical point of view, there are indications that diffusion into xenoliths should be accomplished by the volatile components of a magma and the simple salts which tend to travel with them, rather than by the complex silicate components." This diffusion of substance to and from a xenolith constitutes reciprocal reaction, and such diffusion will go on till it results in stabilising the mineral assemblage of the xenolith so that its mineral phases are in equilibrium with the contaminated magma. The actual gaining of various oxides by reciprocal reaction is not the only way in which the magma may alter its constitution. There are also other methods which may be loosely described as 'mechanical' by means of which the magma incorporates solid material from the invaded rock. Three main methods of incorporation may be noticed: (1) when the invaded rocks of xenoliths are not in equilibrium with the magma as regards all their phases, (2) when they do remain more or less in equilibrium, (3) when magma material is injected *en masse* into the xenoliths or country rocks at the contact.

#### Science News.

Mr. Muhammed Zakiuddin, M.Sc. (Alig.), Research Scholar, Aligarh, writes, "The first Society for the study of the Sciences was started by the late Sir Syed Ahmad Khan at Ghazipore in 1864. It was named the Scientific Society and its objects were:—(1) To translate in such languages as may be in common use among the people, those works of arts and sciences, which being in English and other European languages are not intelligible to the natives; and (2) To search and publish rare and valuable Oriental Manuscripts (non-Religious)".

The seat of the Society "was to be fixed ultimately at Allahabad but before the Society was set a thorough going it was to be where Sir Syed was stationed".

From 1864 the proceedings of the Society were published and an Urdu Journal was started known as *Tahzeeb-ul-Ichlaque*—that served the Indians as *Tatler* and the *Spectator* did the Englishmen, and advocated the spirit of free enquiry and search after truth fearlessly. Later on when Sir Syed came to Aligarh, the Society was stationed where the present University Press stands. The Society showed a good deal of active service and the Duke of Argyll, the then Secretary of State for India, accepted its patronship. Mr. R. B. Qadri transferred the seat of the Society from the Gardens to the M.A.O. College in 1896, and this is the beginning of the relations between the Society and the College. In those days popular lectures were delivered and books were also published from time to time.

In 1907, Prof. Harrison added fresh vigour to the Society at the opening of the B.Sc., Classes in the College, but unfortunately he left the College in the same year and it was not before Prof. Duncliffe took charge of the Science Departments that the Society was strengthened. In March 1915 Mr. F. D. Murad drafted a constitution for the Society pointing out that the object of the Society was to develop Scientific taste and to provide popular lectures on Scientific subjects.

About the same time Mr. Murad published the book "India's Neglect of Science and Scientific Education" giving in detail the activities of the Society.

In 1917 Prof. Dr. Wali Mohammad took the charge of the Science Departments and the Wali Mohammad Gold Medal was struck to be given for the best work done by a Science student. The activities of the Society went on, as it goes to-day and in 1920 it was registered as one of the Clubs and Societies of the University. It is interesting to note that the Indian Association for the Advancement of Science was started in 1876—12 years after the Scientific Society was started—by Dr. M. N. Sarkar.

The Society has led to other movements that has made Aligarh a hope for the future under the Presidentship of Prof. Dr. R. F. Hunter, D.Sc., Ph.D., etc., Nizam Professor of Chemistry in the University.

Side by side to the movement has developed another movement. In 1931, the erection of the New Science Laboratories (*Current Science*,