through the galvanometer is not, ordinarily, strong enough to deflect the spot of light off the scale; and even if it is found to be the case the spot can be easily brought back on the scale by increasing the resistance N of the filament circuit. The arrangement is found to be quite sensitive. On completing the circuit at K the spot moves from its position of steady deflection through an appreciable number of divisions of the scale even for a slight lack of balance of the bridge.

The resistances of a few cells were measured by (A) Mance's method as well as by (B) the modified arrangement detailed above. The results are given below. The tests were carried out using solutions of zinc sulphate and ammonium chloride of different strengths on different dates. It will be found that the results obtained by the two methods fairly agree.

RESULTS.

Resistance of one Daniell's Cell (in Ohms.)

Method A ..	0.78	1.12	1.30	1.43	1.44
Method B ..	0.80	1.13	1.30	1.43	1.50

Resistance of one Leclanche's Cell (in Ohms.)

Method A ..	0.70	1.00	1.90	3.20	3.20
Method B ..	0.70	1.00	1.90	3.15	3.20

R. C. SEN.

Physics Department,
G.B.B. College, Muzaffarpur,
May 10th, 1932.

Research Notes.

Halogen Compounds of the Rare Gases.

ONE of the most interesting communications that have appeared in the chemical publications of the last few months is that made by Antropoff, Weil and Frauenhoff (*Naturwissenschaften*, **20**, 688, 1932). Starting from the generally accepted assumption that the valency of an atom depends upon its tendency to have only eight electrons in the outermost "shell", these workers concluded that the rare gases need not necessarily have zero valency: they could as well be octavalent (helium divalent). It was thus expected that especially the heavier of the rare gases could form compounds above all with the halogens.

The experimental arrangement was roughly as follows:—A mercury pump is arranged to send crypton gas through a series of glass tubes through which electrical discharges of high intensity can be sent and also through some bulbs cooled by liquid air. The pressure of the crypton varied between 5 to 1 mm., and as its vapour pressure at the temperature of the liquid air is 17 mm. the crypton does not condense. In the discharge tube, the crypton was mixed with chlorine, which is again removed from the mixture by freezing, when it passes through the cooled bulbs. A MacLeod manometer was used for measuring pressures.

It was seen that as soon as the electric current was switched on, the gas-pressure was observed to sink to as much as half its value in 10 minutes. This diminution in pressure is also obtained with crypton and bromine, but not with argon and chlorine nor when the crypton-chlorine mixture is not subjected to the electric discharge. The only explanation which would explain this diminution of pressure is that a compound between the crypton and the halogen is formed and condensed by the liquid air. Moreover, a dark red substance was always observed in the freezing bulb whenever and only when a diminution of pressure took place and it was seen to be much more volatile than chlorine and possesses a band-spectrum. It can even be made to react with calcium, the reaction being violent, and the remaining gas shows then the pure spectrum of crypton.

Curiously enough, this crypton chloride seems to be quite a stable body, and the gas obtained from the above-mentioned red body, after standing for a number of days at room temperature, can again be condensed to the same red coloured substance. Even in contact with hot mercury, the rate of decomposition is very slow.

One can scarcely over-state the case if one says that Professor Antropoff and his colleagues in Bonn have made here an epoch-making discovery and if their observations are verified by other independent observers, they will constitute one of the most important supports for the Bohr-Rutherford atom.

The Inheritance by an Insect Vector of the Ability to Transmit a Plant Virus.

[Storey, H. H., *Proc. Roy. Soc.*, B, **112**, 46 (1932).]

THE possibility of having unequal ability to transmit a virus by the different races of a

species was suggested several years ago; but Dr. Storey working on the races of *Cicudulinambila* and the virus of streak disease of maize has experimentally demonstrated that it is actually so. He further states that the ability to transmit the virus is inherited as simple dominant Mendelian factor, linked with sex.

Experimental Distortion of Development in Amphibian Tadpoles. Pt. II.

[Sladden, D. E., *Proc. Roy. Soc.*, B, **113**, (1932).]

FROM observations made on a large series of experiments of various kinds involving the rearing of many thousands of frog tadpoles, the author concludes that apart from action of sugar or pH variation there is another factor which has a fundamental influence on the developing eggs of these animals. This unknown factor, according to the author, comes into play as a result of overcrowded conditions. Under these conditions the oxygen content of the water is reduced while the amount of CO_2 and nitrogenous products are automatically increased. The greatest number of abnormalities occur among those animals which are most weakened through lack of food and oxygen.

Carotinoid Colour Substances of Fishes.

LONNBERG (*Arkiv: for Zoologi*, **23A**, Hafte 4, 1932) has determined the nature of the colour substance of fishes by chemical tests, especially with the aid of antimony chloride and has come to the conclusion that the so-called lipochromes of fishes are really carotinoids. A large number and variety of fishes have been examined, and a comparative account of the respective spectra of the carotinoids reveals that the colour solution of the majority of them cannot be fractioned and must therefore be unitary. And in many cases the carotinoids belong to the xanthophyll group and this is of great interest as many of the marine invertebrates which serve them as food belong to the carotine group.

The Age of a Monazite Crystal.

[Fenner, C.N., *Amer. Jour. Sci.*, **136**, 1932.]

FENNER'S contribution is of special interest in view of the growing possibilities of being able to determine geological ages by calculations based on the principles of atomic disintegration of radio-active elements. The uranium, thorium and lead contents of the monazite crystal have been determined and on the supposition that the lead has been derived from thorium by radio-active disintegration, an age of 277,900,000 years is calculated. Seeing that this result agrees very closely with the age of an uraninite from the same quarry determined several years ago as 282,900,000 years by W. F. Hillebrand, it will be obvious that the fundamental principle involved in this method of calculating the age of radio-active minerals is essentially sound and reliable.

Notes on some early Blastocysts of the South American Bat,—Molossus.

[G. S. Sansom, *P.Z.S.*, Part I, March 1932, pp. 113-118.]

THE early development of Molossus agrees fairly closely with that of the other Micro-Cheiroptera. The orientation of the blastocyst at right angles to the mesometrial axis is noteworthy; it occurs in all the six early stages, but is not preserved in the last, considerably later blastocyst, where the embryonal disc is directed more towards antimesometrial side. The primitive amniotic cavity arises as a cleft in the amnio-ectodermal mass and its formation is apparently initiated by the rearrangement of the cells. The roof of this cavity thins out and ultimately disappears with the result that a cavity is formed bounded on the one side by the shield ectoderm and on the other by the thin layer of covering trophoblast. The definite amniotic cavity is formed by the ingrowth of ectoderm from the margins of the ectodermal shield in contact with the covering trophoblast. The slight activity of the cytotrophoblast and the apparent absence of syncytiotrophoblast even in the latest stage described are noteworthy. The trophoblast in these early stages appears to be devoid of phagocytic or cystolytic properties.

The Genus Hyracotherium.

THE European and American genera of Eocene horses have been subjected to a revision in an interesting paper (*Phil. Trans.*, 1932, **B 221**, 481) by C. Forster Cooper. The prevailing practice is to give the American forms the name Eohippus and the European forms Hyracotherium, Propachy-

nolophus and Pachynolophus and there is a difference of opinion whether Hyracotherium differs from Eohippus or not. Cooper after examining the material contained in the British Museum, the Royal College of Surgeons, the American Museum, the casts of Pachynolophus and Propachynolophus from the University of Lyons and the Cambridge specimens in the collection of the Sedgewick Museum, has come to the conclusion that all the specimens of Eocene horses discovered in Britain constitute a single genus Hyracotherium comprising three species, H. cuniculus, H. leporinum and H. vulpiceps. The forms Hyracotherium and Eohippus present more points of similarity than difference and the distinction hitherto drawn between them is untenable. Judged from the dental characteristics, Hyracotherium cannot be considered as more primitive than Eohippus, the species of the former belong to the same stage of evolution as those of the latter. No distinction can be drawn between the European form Propachynolophus and the British genus Hyracotherium and some forms of Pachynolophus are hardly distinguishable from the latter.

Thalamic Connections in the Rat.

THE experimental study of thalamic connections in the rat by W. E. Le Gros Clark (*Phil. Trans.*, 1932, **B 222**, 483) has given some extremely interesting results having a bearing on the interpretation and significance of the different nuclear centres in the optic thalamus. The relations of the nuclear centres to the cerebral cortex and with other parts of the brain studied by Marchi technique offer interesting points of phylogenetic importance. It is found that the more dorsal and lateral parts of the ventral nucleus have fibrous relations with the dorsal area of the parietal region of the general sensory cortex and the ventral aspect of the nucleus ventralis being connected with the ventral and medial parts of the same sensory and insular areas. Thus the fibres take a definite route to the cortex. No thalamo-cortical fibres from the medial ventral nucleus could be traced in the rat but the degenerate fibres traceable from the site of lesion suggest that they are thalamo-striate in nature. The nucleus medialis ventralis is regarded as homologous with the nucleus rotundus of reptilian diencephalon because of the topographical relations and the connections of the nucleus in both cases with corpus striatum. In the evolution of mammals it is significant that the medioventral nucleus so well defined in the primitive forms gradually becomes indistinct till it is finally lost in the primates. The studies of Clark lend evidence in support of Edinger's contention that there is a thalamo-mamillary component of the bundle of Vicq De-Azyr besides the transverse connections of the two anterodorsal nuclei of the anterior group, across commissura-inter-antero dorsalis. Of the three elements composing the anterior group of nuclei, the antero-ventral one is connected with the whole area singularis of the cortex by corticipetal fibres, while the antero-medial nucleus provides no evidence of cortical connections but has connections with the antero-ventral nucleus of its own group, the nucleus medialis ventralis and also with the nuclei of periventricular system. No evidence could be obtained for establishing cortical connections with antero-dorsal nucleus. Of the three components forming the anterior group of nuclei the antero-medial one may be regarded as representative of the palæothalamus and evidence has been adduced to establish its derivation phylogenetically from the nucleus dorso-medialis of the reptilian thalamus, a nucleus which is not related to the somatic areas of the lateral part of the fore-brain. Regarding the lateral nucleus which comprises pars principalis and pars posterior, the conclusion is reached that the former is related by reciprocal fibre connections to the most dorsal limit of the parietal area on the lateral surface of neo-pallium close to the median line,—this conclusion fits in with the conception that the great expansion of the main part of the lateral nucleus in higher mammals is associated directly with the progressive elaboration of the parietal association areas in these forms. There is no evidence to establish the corticifugal connection of the pars posterior. The dorso-medial nucleus which is equivalent of the medial nucleus of the human brain is regarded by certain authors as a palæo-thalamic centre (which is really the antero-medial nucleus of the anterior group as has been shown by Clark). In fact the nucleus dorso-medialis is one of the recently developed thalamic elements and is not homologous with the nucleus dorso-medialis of reptilian diencephalon. For this reason, it is desirable not to include it in the medial nuclear group. The studies of Clark have still left in

doubt whether the nucleus pretectalis is part of the thalamus, occupying as it does a position at the junction of the mid-brain and the diencephalon. There is evidence, however, that it has fibre connections with the posterior part of the parietal area of the cortex but not a corticipetal character. The system of the nuclei of the midline is formed by the descending fibres of the ganglia habenula and of the dorso-medial nucleus. From the evidence adduced by the researches of Clark, it appears that in the rat cortico-thalamic fibres terminate in all the principal nuclei of the thalamus with the exception of the nucleus antero-medialis, nucleus medialis-ventralis and the nuclei of the midline. In the higher mammals such connections are apparently very insignificant. The experiments on the rat show that corticotectal fibres arise from the occipital lobe of the cerebrum which is in accordance with the observations of previous authors. There is also evidence that in the rat all the principal nuclei of the thalamus proper send off projection fibres to the neopallium with the exception of antero-medial nucleus, nucleus medialis ventralis and nuclei of the midline. These are therefore the only thalamic elements which can be considered as homologous with the palæothalamus of great phylogenetic age.

An Analysis of Some Necrotic Virus Diseases of the Potato.

AN analysis of some necrotic virus diseases of the Potato forms the title of a valuable article by R. N. Salaman and F. C. Bawdan (*Proc. Roy. Soc.*, **B III**, 769, 1932) in which after giving full details of the previous works of the subject, the authors describe how our views on the virus diseases of plants have passed through the phase when protein reactions are mistaken for specific disease and given special names, *e.g.*, the leaf-drop streak which is known to be induced by one single virus and that virus is Kenneth Smith's Y. It is further known that Quanjer's top-necrosis is caused by different agents altogether. In limited number of varieties this disease can be produced by Kenneth Smith's X virus acting alone. The other varietal reactions are designated as Top-Necroses A, B & C. Top Necrosis A is shown to be caused by a complex of both X and Y possibly associated with virus Z. Top Necrosis B is likewise due to a complex containing both Z and Y. Top Necrosis C is caused by both X and Y. Top Necroses X and C complexes are transferable to other Potato varieties by needle inoculation. Top Necroses A and B are uninoculable except that A can be conveyed to varieties like Arran Crest and Epicure, by needles. Top Necrosis A is found among the widest grown varieties such as the Arran Banner, Majestic and Up-To-Date, a fact that leads to this consideration of practical and economic importance. Looked at from the pathologist's point of view, these carriers of virus are vast reservoirs of the most destructive of all the virus entities we know, dangers to other varieties and even a danger to themselves—for a carrier Up-to-Date can go down to a further infection of the very virus which it itself is carrying. The authors suggest a way out of the dilemma either by aiming at growing only virus-free stocks—a possible though difficult and costly task—or using only such varieties as are successful carriers of the more serious virus diseases.