

Research Items.

DECIPHERING CHARRED DOCUMENTS.—Mr. Raymond Davis, of the Bureau of Standards, Washington, finds that the written and printed matter of papers that have been thoroughly charred, as, for example, by being heated in an iron box or safe, may be deciphered by placing the charred sheet in contact with a fast or medium plate for a week or two in the dark and then developing as usual. There appears to be an emanation that affects the plate except where the charred ink acts as a protective coating. It is curious that films need a much longer contact than plates, and that sometimes the effect is reversed unless the film is previously washed and dried.

THE GYPSIES OF TURKEY.—Prof. W. R. Halliday has collected from a wide range of literature an account of the Turkish gypsies in the *Journal of the Gypsy Lore Society* (3rd series, vol. i., part 4). The conventional estimate of the number of these people in modern Turkey is 200,000, but there is no accurate material for forming any conclusion which possesses the slightest value. The more rigid Osmanli hates them as infidels and dreads them as magicians, and the Christian view of the gypsy's irreligion and genial roguery is illustrated from the folk tales. This feeling is based on the laxity of their religious observances, for in this area religious rule has the added sanction of corresponding with racial or natural cleavage. This thievish habit and way of life have naturally made them unpopular, and it is widely believed in Turkey that they dig up graves and eat corpses, a belief probably based on their habit of eating carrion. It is also stated that they drink annually a secret potion, the composition of which is known only to the oldest and wisest of the tribe, which secures immunity from snake-bite. They are also said to furnish the most expert executioners in Constantinople, but this is scarcely credible. Their employment as bear-leaders is reflected in the dislike shown towards black and brown bears, and to the use of the skins of these bears by furriers in Constantinople.

CERCARÆ FROM INDIAN FRESH-WATER MOLLUSCS.—Maj. R. B. Seymour Sewell has given an account (*Ind. Journ. Med. Res.*, vol. x., Suppl. Number, 1922) of the anatomy and biology of 52 cercariæ, which he has preferred to designate by numbers as he considers that at present the basis of specific distinction is vague. The majority of the fresh-water molluscs are born in May-August, live for approximately two years, and then die from natural causes. The vitality of heavily parasitised specimens is considerably impaired. The maximal periods of miracidial infection occur in May-June and in September-October, that is, just before and just after the monsoon season. During an examination of nearly 4000 fresh-water snails a double infection—two forms of trematodes developing simultaneously in the same snail—was met with only in eighteen cases, namely in sixteen *Melanoides tuberculatus* and two *Indoplanorbis exustus*, the two most widely distributed species of mollusc in India. Cases are comparatively common in which one form of trematode was found developing from parthenitæ (sporocysts or rediæ) while another was found encysted in the tissues. Maj. Sewell records that on several occasions he observed in sporocysts (producing cercariæ XV., closely related to *Cercaria vivax* Sonsino) the occurrence of miracidia—some of which were still in an incomplete state of development and enclosed in a thin capsule, but others were swimming freely in the cavity of the sporocyst. The sporocyst and

redia are not sharply demarcated stages; it is easy to form a graded series beginning with an undoubted sporocyst which appears to be devoid of all structure, passing through forms—in which excretory and certain other organs are partly developed—which might be considered either as sporocysts or as rediæ, and ending with undoubted rediæ with well-developed alimentary canal, a complicated excretory system, definite nervous system and genital organs, and active locomotor processes.

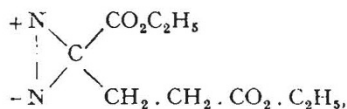
GEOLOGY OF NEW ZEALAND.—The latest view as to the grouping and correlation of the much-discussed strata of New Zealand is embodied in one of the pamphlets conveniently extracted from the *New Zealand Journal of Science and Technology* (vol. 5, No. 1, 1922). In this Mr. P. G. Morgan, director of the Geological Survey, gives geological maps of both the great islands, printed clearly in black and white, on a scale of 1 inch to 40 miles. If these were not so economically printed back to back, they might well be mounted by their fortunate possessor and coloured according to the international scheme. The divisions of the Maitai systems (formerly held to be Triassic and Jurassic, but now shown to be Permo-Carboniferous) are still undecided; but it is clear that the grouping of these rocks on the geographical axis of the southern island is not a tectonic feature, their general strike being north-westerly. In the epoch of their deposition, New Zealand lay on the margin of Gondwanaland, and it seems reasonable to suggest that the strike of the Maitai systems, when they came to be folded, was determined by the pressures from the south that crumpled the beds in Jurassic times in the coast-ranges of the Cape Province of S. Africa. As Mr. C. A. Cotton has pointed out ("The Outline of New Zealand," *Geographical Review*, vol. 6, p. 320), the present form and features of New Zealand have been largely determined by faulting, with the formation of blocks of uplift and depression. The dominion is developing its culture on a mere fragment of land left among the deeps.

PALÆONTOLOGICAL RESEARCH IN CHINA.—The third Asiatic Expedition of the American Museum of Natural History has been co-operating with the staff of the Geological Survey of China, and, in view of the interest taken in their joint researches, Mr. J. G. Andersson, with his colleagues of the Chinese Survey, have issued a brief summary of the results of the Survey's operations so far as carried out (*Bull. Amer. Mus. Nat. Hist.*, xlvii, art. 13). The fossil invertebrates are being worked out by Dr. A. W. Grabau, now palæontologist to the Geological Survey of China. At present these have been obtained almost exclusively from the palæozoic deposits, and will be described in the near future in a work devoted to Chinese palæontology, initiated by Dr. V. K. Ting, the director of the Geological Survey of China, and entitled "Palæontologia Sinica." Of considerable interest is the discovery of the first Eurypterid in China in the coal measures of the Kaiping basin in strata of Lower Permian age. Coal deposits are plentiful and range from Palæozoic to early Tertiary. By far the most interesting among the plant beds of China are the Permo-Carboniferous coal series, while those of the Jurassic of northern China come next in importance, and the Oligocene flora of Fushun, in Fengtien, is the most representative of the Tertiary beds. Of the fossil vertebrates the principal description hitherto has been that of Schlosser, who, however, procured his material from Chinese medicine shops. Mr. Andersson has now

brought together extensive collections. The Hipparion clays of northern China prove the richest deposits so far. The north China loess but rarely contains fossils. One of the commonest is the egg of a big ostrich, *Struthiolithus chersonensis*. There is also an elephant, doubtfully referred to *Elephas namadicus*. No undisputed proof of the existence of Palæolithic man has as yet been obtained, nor of any Older Neolithic culture.

INDUCTION MOTORS AS SYNCHRONOUS MACHINES.—In the *Journal of the Indian Institute of Science*, vol. 5, part 4, p. 37, there is an interesting and useful paper by S. V. Ganapati and R. G. Parikh on induction motors used as synchronous machines. From the point of view of the engineer of the supply station the large "wattless" current taken by induction motors is a serious drawback to their use, and methods are sometimes employed to penalise consumers in proportion to the amount of wattless current they take. The authors have experimented on induction motors by supplying their rotors with direct current and thus converting them into synchronous machines. They found that they were more unstable than ordinary synchronous motors, as a relatively small decrease in the exciting current caused them to fall out of step. They find also that, for heavy loads, this method involves a sacrifice of efficiency and only a slight diminution of the wattless current. It is also necessary to adjust the excitation to the load and hence it is unsuitable for fluctuating loads. The advantages of synchronous operation are only pronounced at times of light load.

POSITIVE AND NEGATIVE VALENCES.—The *Recueil des Travaux chimiques des Pays-Bas*, which was founded in 1882 and of which the forty-first volume has just been completed, is now to assume an international character, since it has been arranged that the *Recueil* will henceforth contain articles in French, English, and German. With this announcement there has been circulated a double number for September and October 1922, in which this policy has been put into operation. The issue contains the papers read at an International Congress of Chemistry held at Utrecht on June 21-23, 1922. It includes 14 papers, of which three are in English, four in French, and seven in German. The three Russian authors contribute two papers in French and one in German, while the Swiss contribution also appears in French. Perhaps the most interesting of these papers is the one in which Prof. W. A. Noyes discusses the question of positive and negative valences. He puts forward as evidence of the real existence of oppositely polarised atoms the production of an optically active form of the diazo compound



where it is almost impossible to find a satisfactory explanation of the optical activity except by supposing that the two nitrogen atoms differ sufficiently to destroy what would otherwise be a plane of symmetry of the molecule. The question of free radicals is also discussed in two papers by Prof. Walden and Prof. Schenck.

STRESSES IN BEAMS, RINGS, AND CHAINS.—The honorary members' lecture to the Junior Institution of Engineers for the year 1922 was delivered by Prof. E. G. Coker, who chose for his subject "that branch of the elasticity and strength of materials which deals with the stress distributions in curved

beams, rings, and chain links." The lecture is printed in the *Journal of the Institution*, Part 6, vol. xxxii., and forms a valuable résumé of the application of the optical properties of transparent bodies to the determination of the stresses in these bodies. It is pointed out that in plain stress, all materials which fulfil the primary conditions of elasticity are stressed in precisely the same manner under similar conditions of shape and loading, and so the stresses can be found by observation on transparent material like nitro-cellulose. The cases dealt with are the straight beam subjected to bending moment (to show that when the beam is unsymmetrical about the plane of bending, the usual formula giving the stress in terms of the change of the curvature is not correct), discontinuities in beams, short beams, beams of constant curvature under uniform bending moment (as being of theoretical interest), the crane hook, circular rings, elliptical link with and without stud, circular link with straight sides, and various kinds of piston rings. The mathematical treatment is indicated, while in two appendices is given in brief the mathematical theory of stresses in curved beams (Andrews and Pearson) and of stresses in curved links (Pearson-Winkler theory). Prof. Coker's lecture is a record of important researches on an important subject, to which he and his assistants have made very considerable contributions. It is of interest to note his opinion "that the stress distribution in complicated bodies . . . is one which still demands a very large amount of study by analysis and experimental research."

THE FINITISTIC THEORY OF SPACE.—The logistic mathematicians are very boastful of their claim to have solved the paradoxes of Zeno by their new definition of infinity as a compact series. Their doctrine, however, is not unchallenged. Dr. Petronievics in his "Principien der Metaphysik" has put forward the theory of the finiteness of the number of points in space. His argument is set forth from the point of view of mathematics, metaphysics, and also what he terms hyper-metaphysics, and historically it is claimed to be as old as Pythagoras. A clear, concise, and easy account of the doctrine is given in "Die Lehre vom diskreten Raum in der neueren Philosophie," by Dr. Nikola M. Poppovich (Wilhelm Braumüller, Wien und Leipzig, 1922). It is the thesis for the doctorate of philosophy awarded by the University of Berlin the year preceding the war. Dr. Poppovich reviews the whole problem of the principle of the continuity and discreteness of space from ancient to modern times. The theories fall for him into three types. The first he names the infinitistic realistic, it includes Bolzano and Cantor; the second, the infinitistic idealistic, includes Leibniz and Kant, and in the nineteenth century is represented by Renouvier; the third is the finitistic realistic doctrine of Petronievics. According to this last there is a clear distinction between real and unreal points. The essence of the doctrine would seem to be that the compact series which separates two points is not a series of real points in the sense in which the two definite points are real. The compact series has no other function than that of holding the two real points apart. Thus, to take our own illustration (if we are rightly interpreting the doctrine) the integers 1, 2, in the numerical series are separated by an infinite, *i.e.* a compact, series of fractions, but this series is unreal, *i.e.* imaginary; it serves the single purpose of preventing the two units falling into one identity. The theory leads Dr. Petronievics to affirm the absoluteness of Euclidean space.