

## Research Items.

**CARVED STONES IN ASSAM.**—In vol. 20, New Series, No. 5 of the Journal and Proceedings of the Asiatic Society of Bengal, Dr. J. H. Hutton gives some further notes on two groups of carved meihirs in Assam, one at Dimapur in the Dhansiri Valley and another, which is scarcely known, at Kasomari-pathar near Jamuguri in the Dayang Valley. Adjacent to the latter are remains, previously undescribed, consisting of a couple of carved stones and a broad upright slab surrounded by the remains of a brick wall. One of the stones is carved into a hollow like a basin. Outside its rim is a trough ending in a spout. The second, an oblong stone, is carved into a wedge-shaped trough. The upright slab, at the foot of which a hollow has been excavated, is broken at the top at a point originally pierced by two round holes. As the basin must have been connected with a libation ceremony, it is possible that an offering was poured through the two holes as is done by the Angami to-day in the *lisü* ceremony at which wooden phallic symbols, corresponding to the monoliths at Dimapur, are erected. The Kasomari monoliths presumably are also phallic, or connected with fertility, as is shown by two pairs of domes on one stone which undoubtedly represent breasts.

**ABORIGINAL ROCK PAINTINGS AND CARVINGS IN AUSTRALIA.**—In the course of an account of the aborigines of the Northern Flinders Ranges, Southern Australia, in Vol. 3, No. 1 of the Records of the South Australian Museum, Messrs. Herbert M. Hale and Norman B. Tindale describe some interesting rock paintings in a former native camping ground at Malkaia, six miles south-east from Mount Serle, and a series of rock carvings at Owicandana on a number of outcrops of sedimentary rock. The former, of which the designs sometimes recall those of the carvings, are on a cliff overhanging a shelf and forming a shelter, of which the walls are blackened with smoke from the occupants' fires. The paintings are in pipeclay, charcoal, and red and yellow ochre. The designs consist of perpendicular bars with branches, or crossing bars, a bird track, a meandering pattern possibly representing a snake, a figure which Basedow elsewhere identified as a pubic tassel, a boomerang, etc. The rock carvings are similar to those which have been described by Basedow in other localities in South Australia. They are covered with a hard dark rust-coloured patina and some have been smoothed by age. The present natives are unacquainted with their purpose or meaning. In the main they consist of "corroboree circles," incomplete circles, a few emu and other tracks, and some unidentified designs. Some, the circles for example, are formed by a number of closely connected indentations, possibly made with a stone chisel; others of inferior technique and possibly made with a cold chisel, look like comparatively recent, sporadic attempts to copy ancestral work.

**FUNDAMENTAL WORK UPON THE COTTON HAIR.**—It is very striking to note that the development of fundamental research in the newly formed Research Association dealing with commercial fibres, be they wool, flax, or cotton, leads the investigators back to study their problems in terms of their fundamental biologic unit. This is again exemplified in the study of the mercerisation of the cotton hair without tension by Mary Alexandra Calvert and Frederick Summers, which has recently been published from the British Cotton Industry Research Association (Journal of the Textile Institute, vol. 16, pp. T233 to T268, August 1925). These investigators have shown how regular is the change of width of the single hair during

swelling upon mercerisation, in a number of typical cottons, and how fully this change can be accounted for in terms of the change from collapsed dry hair to a hair with swollen elliptical section, contracted in length and with lumen nearly filled by the swollen wall. Further, they show that no additional change in width can be produced by increasing the concentration of sodium hydroxide beyond about 16 per cent., and that the maximum width then obtained is identical with the width of the original hair as it existed in the fruit boll, contraction occurring as the boll opens and the hair dries. They show in addition that the reason for this limit to increase in girth must be sought in the cuticle, which fails to extend beyond its original dimensions in spite of the pressure of the swelling cellulose within. When the width of this mercerised hair afterwards shrinks, without change in the shape of the cross-section, as the hair is washed in water and then dried, this inextensible cuticle smoothly follows the contraction, and the authors have some very interesting suggestions as to the minute structure of the cuticle in the light of its behaviour. These suggestions are accompanied by some very good microphotographs. In fact, this study in a field of applied science is a botanical contribution of absorbing interest.

**AN AUTHENTIC BUD VARIATION IN POTATO.**—So recently as 1918 so experienced a plant breeder as Mr. A. Sutton expressed the view that "there is no ground for believing nature ever has given rise to any new and distinct variety of potato by bud-variation." The point at issue is of first-rate importance, both scientifically and from the practical point of view, and it is therefore very interesting to have Mr. R. N. Salaman's confirmation, as the result of extensive breeding experiments, of Mr. McKelvie's original view that he had found an authentic bud sport turning up in the case of the Arran Victory potato. Thus sponsored, this bud sport, or somatic mutation, deserves the most serious consideration. Actually a series of such sports has been under observation, the obvious point attracting attention to them being the suppression of patches of the purple coloration in the skin, leading ultimately to a form with white tubers with occasional patches of colour, or, in the extreme form, tubers with a pure white skin. Most of the forms thus arising produce plants with vegetative form and foliage indistinguishable from Arran Victory; but one remarkable mutant has definitely a different growth form and different shaped leaflets, a point noticed by McKelvie and completely confirmed by Salaman. This same mutant also shows the tuber form altering in a large majority of its produce from the typical round tuber of Arran Victory towards a typical "kidney." Mr. Salaman has carried out crossing experiments with these bud mutations, with the result that the loss of pigment in the tuber appears to be accompanied *pari passu* with a reduction in the number of ovules capable of giving rise to coloured tubers. Thus it appears that a change arising in a vegetative shoot and propagated in the first place vegetatively, a change presumably in the genes controlling colour formation in the tuber but, in one mutant form at least, associated with other far-reaching changes in the constitution of the plant, has been associated with changes in the genetic constitution of the germ cells. Mr. R. N. Salaman describes his breeding experiments in the *Journal of Genetics* (vol. 15, No. 3, July 1925), his final conclusion being that "A somatic mutation which is characterised by the loss of a specific character such as pigmentation of the tuber skin, may evince this loss in other directions.

both in its own body and, through its germ cells, in its offspring."

**MOVEMENT OF SAND CAYS.**—A short report on the movement of sand cays on the Great Barrier Reef under the influence of atmospheric conditions is contributed to the *Queensland Geographical Journal*, vol. 39, by Lieut. T. Taylor, and forms one of the Great Barrier Reef committee's reports. Beaver Cay, on a small coral reef about 20 miles from Dunk Island, was used as a triangulation station in 1921. In 1922 the position was found to have moved. The position of the new mark was fixed, and after an interval of two months, during which high winds prevailed, was redetermined. Again it was found that the cay had moved. In short, there seems to be no doubt that this cay, as well as another three miles distant, moved approximately 100 yards in less than two years. The paper is accompanied by a chart of the reef and cays.

**THE COMPTON EFFECT.**—When  $\gamma$ -radiation falls on matter it is "scattered," that is, sent off in directions which make angles  $\theta$  with its direction on incidence, and the scattered radiation is "softer," that is, more readily absorbed, than the incident. Two years ago Compton came to the conclusion that the scattering was accompanied by an increase of wave-length of the radiation which for a range from 0.7 to 0.025 Ångström units was equal to  $0.048 \sin^2(\theta/2)$ . He also gave an expression for the intensity of the scattered radiation in the direction  $\theta$  which involved the term  $1 + \cos^2 \theta$ , basing his work on the quantum theory. In the issue of the *Physikalische Zeitschrift* for July 21, Dr. G. Wentzel discusses the experimental results obtained up to the present time and the alternative theories which have been proposed to explain them, and comes to the conclusion that the Compton theory is most in harmony with the facts.

**CONTACT ELECTRIFICATION OF SNOW.**—A series of experiments on this subject and some measurements are described by Dr. A. Stäger in the *Annalen der Physik* for August. When hoar frost is blown away from an ice surface by dust-free air, it is negatively charged, one gram carrying on the average -180 electrostatic units, and in exceptional cases -1000 units. An experiment at the Hahnenmoos Pass in the Bernese Oberland, with icicles about 20 cm. long and 1 cm. thick suspended by silk threads attached to the two ends, showed that when they were hung in the drifting snow near the ground, and then brought into contact with a Lutz electrometer, deflexions of more than 56 volts were generally obtained, the charge being negative; when they were hung in the finer drifting snow one or two metres above the ground, the charge was generally positive and smaller than before. It was found that an iron wire, 9 metres long and 0.3 mm. thick, could be raised to a potential of several thousand volts by driving snow, and could give a continuous current for several seconds with about 3 watts power. The method used by the author in measuring the space charge during snowfalls is described, together with experiments with solid carbon dioxide and with different powders, in some of which luminous effects are obtained similar to those which have been observed in clouds of street dust. The experiments are used to explain winter thunderstorms, and the connexion of sleet and hail with ordinary thunderstorms where the ice effect, in addition to that due to liquid water, contributes to the production of electric charges.

**RESISTANCE TO CORROSION OF ELECTROPLATED CHROMIUM.**—Mr. F. A. Ollard read a paper on this subject before Section B (Chemistry) of the British Association, at the recent meeting at Southampton.

Two series of tests were described, one made in the laboratory and the other in service. The laboratory tests were made on test pieces cut from a strip of mild steel, which were then plated with cadmium, nickel, copper and chromium and combinations of these metals in various orders. The test pieces were then subjected to an exposure test, boiler test, salt spray test, and heat test, and the results noted. The most satisfactory results were shown by the test pieces which had been plated first with nickel and then with a thin layer of chromium. Test pieces plated first with cadmium and then with chromium showed a tendency for the chromium to flake off, and all test pieces containing cadmium failed badly under the influence of heat. The nickel-plated specimens usually showed a certain amount of surface corrosion, while the specimens in which the chromium was plated directly on to the steel usually failed owing to the coating being somewhat porous. Contrary to expectations, the chromium stood fairly well in the salt spray. The second series of tests were made by placing chromium-plated articles in service. Spoons, forks, and knives were treated by this process and used in various places under very heavy conditions, and these remained bright and untarnished without any cleaning. Also, some small parts on motor-cars, etc., had been plated and are standing very well, although sufficient time has not yet elapsed to give any definite results. A pin in a die-casting mould has also been treated and appears to withstand the action of the molten metal very satisfactorily. It is hoped to do a considerable amount of further work on this subject, and among the experiments to be tried are the effects of sea water and the variation of reflective power with ageing.

**TUNGSTEN IN CONSTRUCTIONAL STEELS.**—R.D. Report, No. 65, from the Research Department, Woolwich, gives an account of an investigation carried out by Mr. J. A. Jones on "The Influence of Tungsten on the Properties of Medium Carbon Steels containing Nickel and Chromium." The carbon varied from 0.3 to 0.4 per cent., nickel from 2.5 to 5.9 per cent., chromium from 0.6 to 1.1 per cent., and tungsten from 0.7 to 2.4 per cent. The thermal critical ranges, microstructure, and mechanical properties of a number of these alloys have been examined. The principal results are that in steels of otherwise identical composition increasing tungsten raises very slightly the temperature of  $A_{c1}$ . The rise amounts to about 8° C. for the addition of 1 per cent. of tungsten. This element behaves like other alloying elements in increasing the efficiency on hardening at the slower rates of cooling such as are involved in the heat treatment of large masses. Its effect in this direction is most pronounced when added to nickel steels containing about 6 per cent. of nickel. Addition of tungsten also reduces the fall of hardening produced by tempering. The carbon-tungsten steels containing up to 1.7 per cent. of tungsten, and the 3.5 per cent. nickel-tungsten steels containing less than 1.5 per cent. of tungsten, with a carbon content of 0.3 per cent., did not give sufficiently good mechanical properties to be considered as high tensile constructional steels. Remarkably good properties are, however, given by the 6 per cent. nickel steel containing 0.3 per cent. of carbon and 0.6 per cent. of tungsten. The steel giving the most promise of useful application was a steel with 6 per cent. of nickel and from 0.6 to 1.0 per cent. of tungsten. The author's final conclusion is that while tungsten, in common with other alloying elements, beneficially affects the properties of constructional steels, there is nothing so distinctive in its influence as to warrant any special recommendations in its favour.