Research Items.

DIFFUSION OR INVENTION IN CULTURE.—In *Psyche* (Oct. 1926), Dr. Bronislaw Malinowski has a most illuminating article on the life of culture, in which he attempts to show that the contrast insisted upon by some anthropologists between culture by 'diffusion' or by 'invention' is erroneous. He points out that every modern invention is made and re-made time after time in different places by different men. In the case of 'wireless,' though the invention is popularly ascribed to Marconi it can be traced back through Ampère, Faraday, Righi, Braun, Clerk Maxwell, Hertz, Lodge, and other workers. Thus the invention of radio communication can be treated as a single and singular event and ascribed to one man or another only by a misconception: the point of view of the Patent Office cannot rightly be taken up for the science of culture. Every cultural achievement is due to a process of growth in which diffusion and invention have equal shares. Culture is something always at work, which is there for the satisfaction of elementary human needs, which in turn creates new wants and provides means for their fulfilment. The value of so-called savage 'superstition' is to be found in the confidence that magical rite gives man in forgetting difficulties and in bridging gaps in his knowledge. Borrowing from others does take place, but whenever one culture borrows from another, it always transforms and readapts the objects and customs borrowed. Diffusion is modified invention, exactly as invention is a partial borrowing.

PUZZLE CRAZES.—In the *Nineteenth Century* (Dec. 1926) there is an interesting account by Mr. Henry E. Dudeney of puzzle crazes, with particular reference to the recent popularity of the 'cross-word puzzle.' He traces the development of pastime puzzles from very early days. One of the very oldest is what is now called the 'tangram,' known to the Chinese thousands of years before the Christian era. The Egyptians, too, were fond of puzzles, and there is in the British Museum a treatise of this nature called "Directions for knowing all Dark Things." Coming to more recent times, Niccola Fontana in the sixteenth century published a number of puzzles, some of which are still popular. Mathematical puzzles have interested numbers of people for centuries, while innumerable puzzles have been devised with string, matches, and coins. The word puzzles are for the most part restricted to the particular language in which they appear, and hence lack the universality of those of the mathematical type. Real puzzle acrostics do not appear earlier than the nineteenth century, but they were apparently popular at the court of Queen Victoria. Although puzzles, verbal or otherwise, have always been attractive, yet the popular craze for a particular type would seem to be modern, since it is dependent on easy locomotion, the Post Office, and cheap journalism. The 'cross-word' is not in its nature new, but in its present form it had its first success in the United States. The 'cross-word' is convenient in form, no apparatus being involved; each item can be complete in itself, *i.e.* one need not finish the whole puzzle at one sitting, and hence it is admirably adapted to modern forms of transit; it can be done in groups and hence is not a bar to sociability; there are an infinite number of possibilities, yet one does improve with practice; the habit is easily fixed, and there is constant challenge and stimulus. Sooner or later, the author thinks, the inveterate solvers will have acquired such a large and extended acquaintance with the words of the language that they will want something else. Then the 'cross-word' will end for this generation.

THE TREATMENT OF SYPHILIS.—Mercury has long been known as an effective drug in curing the obvious symptoms of active syphilis. Its use for this purpose has, however, been almost entirely given up since the discovery of the far more efficient salvarsan. Nevertheless, in some clinics it has been the custom, when all signs of the disease have been cured and the Wassermann reaction made negative, to follow up salvarsan treatment with a prolonged course of mercury in the hope of finally killing off any residual spirochætes and converting what may be a quiescent infection into a complete cure. In a very thorough study of the results of this procedure in 711 cases treated in Liverpool (Medical Research Council: Special Reports Series, No. 107. London: H.M.S.O., 3*s.* 6*d.* net), Prof. E. E. Glynn, Dr. R. E. Roberts, and Mrs. Bigland show clearly that mercury given in the later stages not only does not prevent relapses, but even actually encourages them. There is no evidence to show whether this is due to the breeding out of strains of the parasite resistant to mercury or to depression of the general health and resistance of the body; but it is an important practical point and raises some curious questions in pharmacology.

ACCLIMATISATION AND HIGH ALTITUDES.—In his recent ascent of the peak of Kibo, the summit of Kilimanjaro, Mr. D. V. Latham was able to make some valuable observations on the physiology of the human body in high altitudes in the tropics. These observations, together with an account of the climb, are published in the December number of the *Geographical Journal*. The peak is 19,710 feet in altitude. Shortness of breath was felt first at 12,000 feet, but was never distressing even at 19,000 feet, and it was noticeable that the body became acclimatised to respiration in reduced pressure. At 18,000 feet, on the fourth day of the climb, breathing was less difficult than at 15,000 feet on the first day, but above 18,000 feet, especially when the gradient was steep, it was necessary to stop and rest after every forty paces. The pulse rate during rest at varying altitudes was not markedly altered and the blood pressure did not vary. Muscular power was diminished at 19,000 feet, where even slight efforts meant appreciable fatigue. Mental processes were also slow at the summit. Mountain sickness in one of the climbers did not appear until 19,000 feet, and in another it became so severe at 15,000 feet that he had to descend 3000 feet for two days' rest, after which he climbed to 17,200 feet before the symptoms returned. Mr. Latham believes that this difficulty can be overcome by gradual acclimatisation, and he does not think that it is due to oxygen-want, since the sickness was always relieved by walking, when the oxygen demand was greater than when resting. The paper contains also some interesting observations on red blood cells at different altitudes.

ASEXUAL REPRODUCTION WITHOUT LOSS OF VITALITY IN THE ORGANISM OF BIRD MALARIA.—Prof. R. W. Hegner (*Science*, 63, pp. 479, 480, 1926) records that *Plasmodium præcox*, the organism of bird malaria, has been met with several times in the United States in the common English sparrow. Whitmore in August 1913 obtained this organism from sparrows in New York and inoculated it into canaries, and Hegner obtained this strain in 1918 and has maintained it in canaries in his laboratory. In 1924 another strain was obtained by Hartman from a sparrow in Baltimore, and this also has been maintained in canaries. The asexual cycle of the New York strain has been shown to be thirty hours and that of the Baltimore strain twenty-four hours; whether the period of the former has become longer

during its extended cultivation in canaries is not known. The number of asexual generations passed through by this strain since August 1913 is more than 3600. The Baltimore strain has passed through about 550 asexual generations and the periodicity seems to have been maintained unchanged, and this may be regarded as a measure of its vitality. Both the strains have maintained their virulence throughout the entire period. Prof. Hegner directs attention to the interest attaching to the rate of reproduction and to the virulence of these organisms living in a constant environment.

CRYSTAL STRUCTURE IN BIOLOGY.—Of considerable interest to biologists is last year's Mather Lecture of the Textile Institute delivered by Sir William Bragg on "The Fine Structure of Animal and Vegetable Substances as Revealed by the X-rays" (*Journal of the Textile Institute*, vol. 17, No. 11, Nov. 1926). The method used in the analysis of crystal structure has been applied to the study of cotton and wool fibres. In the case of ramie fibres the X-rays reveal the presence of multitudes of very minute crystals with some regularity of internal arrangement, in that a certain axis of each crystal is oriented along the main axis of the fibre. Otherwise the crystals are in complete disarray. Herzog (*Journal of Physical Chemistry*, April 1926, p. 457) found the unit pattern of a ramie fibre to be contained in a right-angled 'cell' calculated to weigh four times as much as the actual molecule of cellulose; so that the crystalline structure of the fibre is really very simple, and formed by the repetition of a fundamental unit of pattern containing only four cellulose molecules. The structures of such diverse materials as sugar crystals, rubber, and even chain compounds like fatty acids, have been analysed in the same way. From the point of view of the biologist, this is getting vegetable structure down very fine, and the method opens up a new avenue of approach to the investigation of at least some types of histological and causal problems (see also NATURE, July 24, 1926, p. 120).

THE ORIGIN OF FJORDS.—The vexed question of the origin of fjords was dealt with by Prof. J. W. Gregory in a lecture on the fjords of the Hebrides to the Royal Geographical Society on Dec. 20. While not denying that ice may have played a part in moulding the shape of fjords, Prof. Gregory insisted that other origins must be found for the valleys themselves. He pointed out that the direction of the fjords has no particular relation to the grain of the country, and that the main flow of the ice sheets was frequently across, and not along, the fjords. Fjords originated in rents or fissures due to earth movements. The nature of the earth movements gives a classification into three divisions. First are the rift valleys, due to the sinking of a strip of land between parallel faults; secondly are those valleys, due to a shattering of belts of rock by many tension clefts and the removal of the material by wind, water, and ice; and thirdly, the fjords due to the subsidence of a strip of country against one major fault producing an asymmetric valley. Prof. Gregory attributes the fjords of the Hebrides, like the sea lochs and fresh-water lochs of western Scotland, to the indirect effects of the Alpine folding of Oligocene and Miocene times, and the later Atlantic subsidences. To the Alpine movements was due the rending of the earth's crust, and to the later uplift of the British area was due the gaping of the fissures. The action of the surf along the shore and of erosive agencies inland has since modified these tectonic valleys.

BITUMINOUS SANDS OF NORTHERN ALBERTA.—A further report by Mr. S. C. Ells, of the Mines Branch, Department of Mines, Canada, describes his investigations of the well-known impregnated sands of the Fort McMurray region, on the Athabaska River, northern Alberta, up to the end of 1924. Although the deposits are very extensive, occupying more than 2000 square miles, not more than 3 square miles are readily accessible for commercial exploitation; the rest of the deposits lie beneath a thick overburden and would thus prove relatively expensive to operate. The percentage impregnation varies between 12 and 15, occasionally higher in limited areas. The report gives concise information on the character of the sands, also results of numerous laboratory determinations and analyses. Possibilities of economic development are considered, especially with reference to sources of fuel, power, transportation, markets and climatic conditions under which work would have to be prosecuted. Various processes have been designed to extract the bitumen from the sands, and for utilising the raw material in its natural condition; some of these processes are capable of extension and improvement to adapt them to large-scale operations, others are in the more experimental stage; all important ones, however, are reviewed in the report (No. 632), a document of 244 pages fully illustrated with photographs and diagrams. In addition there are 8 detailed maps and 4 cross-sections; the latter show the relative position of the sands with reference to overlying strata and the trend of present topography. After all the careful field and laboratory investigation which these Athabasca 'tar-sands' have received, particularly at the hands of the author, it will be very disappointing if at least a portion of the available resources cannot be profitably worked.

VACUUM TECHNIQUE.—The issue of the *Physikalische Zeitschrift* for November 1 contains an article of 20 pages by Mrs. M. A. Shirmann, of the Physical Institute of the University of Vienna, on two improvements which have been introduced recently into the technique of high vacua. When a vessel has been exhausted and has to be sealed off from the pump, the sealing process sets free from the heated surface of the glass a certain amount of gas which in general, as the seal is close to the vessel, gets into the vessel. By connecting the vessel to be exhausted by a narrow tube to the trunk tube of the pump and sealing off close to the trunk, only a small proportion of the gas liberated gets into the vessel. The second improvement relates to ground glass joints and to taps in which the seal is effected without mercury or grease. In the case of a joint, the inner cone may be metal or, if not, its outer surface is coated with metal; the outer cone has metal deposited on its outer surface, and between the two metal surfaces an electromotive force is applied which draws the two surfaces together. In the tap the plug is of metal, the outer surface of the barrel is coated with metal, and an electromotive force applied between the metals.

DECAY OF FLUORESCENCE.—In the *Ann. des Phys.*, No. 23, p. 681, 1926, E. Gaviola describes an interesting application of the Kerr phenomena. He shows that a satisfactory electro-optical arrangement may be devised to perform the function of the toothed wheel in Fizeau's measurement of the velocity of light. With this arrangement he has been able to show experimentally, for the first time, that stationary waves, established by a Lecher wire system, possess the wave-lengths predicted by Maxwell's theory. The main purpose of the method, however, was to investigate the rate of decay of the fluorescence of solutions of dyes, and Gaviola finds that the average duration of the fluorescence of solutions of rhodamin B and of uranin in glycerine and in water is of the order of 10^{-9} second. The effect of concentration on the rate of decay, if such an effect exists, appears to be very small.