Research Items.

A SKULL OF PAPUAN TYPE FROM COLOMBIA.—In *L'Anthropologie*, T. xxxiv., No. 5, Dr. R. Verneau directs attention to a close resemblance between the skull of a Tunebo Indian and Papuan skulls, particularly skulls from the island of Mallicolo (New Hebrides). Not only is the general morphological resemblance remarkable, but the absolute measurements are extremely close. The cranial index in each case is 69, and both are hypsicephalic. The maximum transverse diameters vary by three millimetres only, the vertical diameters by one millimetre, and the maximum antero-posterior diameters are identical. In both cases the frontal region is narrow. The chief difference is that the Tunebo skull has a higher cranial capacity, 1775 c.c. as against 1550 c.c. in the Mallicolo crania, probably an individual variation. Where in other respects it varies from the Mallicolo characters, it approaches those of other Papuan crania. Notwithstanding the danger which attaches to conclusions drawn from a single specimen, it appears reasonable to conclude that the Tunebo skull belongs to the Papuan type. Ten Kate and Rivet have demonstrated that traces of the early type of S. American man represented by the Lagoa Santa skulls are to be found from Southern California to Patagonia, while de Quatrefages and, later, Rivet pointed out the close resemblance of this type to the hypsistenocephalic type of Melanesia and Australia. The importance of the Tunebo skull is that it is the first of the type to be found in the Eastern Andes and supplies a link hitherto missing between examples of the type on the Atlantic and Pacific sides of the continent.

SURVEYS IN BHUTAN AND SOUTHERN TIBET.—In the *Geographical Journal* for October, Maj. F. M. Bailey describes a journey which he took for political reasons into Bhutan in 1921 and a subsequent journey through hitherto unexplored parts of that country and Tibet. His route was from Chumbi (Yatung) across the foothills of the Himalayas by Paro to Bumtang, where unexplored ground began. From Bumtang he passed northward into Tibet by the Mönlakarchung Pass to the lake known as Yamdrok Tso and thence westward by Talung to Gyantse. Capt. H. R. C. Meade with a survey party accompanied Maj. Bailey, and a map of their surveys is published with the paper. An area of 9493 square miles, including 6589 original survey and 2904 revision, was mapped on a quarter-inch scale, the work being based generally on triangulation carried out during the journey. Of this area, more than half consists of accurate plane tabling and photo-survey, and the rest of reconnaissance work. The whole of the Mo Chu basin in North Bhutan is still unsurveyed, though several prominent snow peaks were fixed, and the map between Bumtang, where touch was lost with the Assam triangulation, and Lhunbushö (on the Yamdrok Tso) is more or less in the air, and adjusted by astronomical work. The work in the *Geographical Journal* is on a scale of 1 to 750,000.

GONAD AND SOMA IN THE FOWL.—Pézard, Sand, and Caridroit (*C.R. Soc. Biol.* v. 89, 1923) describe on p. 1271 a case of feminisation of an adult Brown Leghorn cock which was castrated at the age of 3 months, and a year later received two implants of ovaries from hens of the same breed. The head furnishings and plumage are now henny. On p. 1103 the authors describe how in plucked ovariotomised hens, as the ovary regenerates, the growing feathers of the lumbar region mirror exactly the various phases of the process. In vol. 90, p. 623, they discuss the results of ovarian implantation into a castrated Brown Leghorn × Silver Dorking F_1 male, and of implantation of ovarian tissue without castration. In both instances there is a swing to the plumage of the female and the appearance of new pigmentation which differs according to whether Leghorn or Dorking ovary was implanted. They suggest that there is a racial specificity of ovarian secretion apparently ignoring sex-linked inheritance. On p. 676 they discuss the phenomenon of pœcilandry: the existence of two sorts of males in one and the same breed. Cocky-feathered Sebright Bantam cocks are to be found in France. From experiments in which the testes from henny-feathered Sebright cocks were implanted in a cock of a cocky-feathered strain, they conclude that the testes of the henny-feathered cock exercise the same effect as an ovarian implant. On p. 737 they describe briefly certain experiments on gonadectomy and implantation, and conclude that castration results in a neuter form, which they designate "the species type," since they consider it to represent the common heritage of both sexes of the same breed, the base upon which the end-result is built.

THE FOOD OF THE WILLOW-GROUSE IN NORWAY.—To *Bergens Museums Aarbok* for 1922–23, Dr. Jens Holmboe contributes a detailed study of the food of *Lagopus lagopus* in the various parts of Norway in every month of the year, based on material collected during 1921–23. So long ago as 1753, Pontoppidan remarked on the difference between the summer and winter diet, the latter consisting mainly of birch-twigs. It has also been recognised that the young eat insects, but these are soon given up and the birds live mainly on seeds, berries, and leaves. Dr. Holmboe's researches show that there is also a considerable difference of food in the different regions, especially as between the coast and the inland districts, and this is chiefly manifest in winter. The reason clearly is that the snow renders the upland vegetation more or less inaccessible, so that the birds are driven to eat the twigs and buds of birch and other trees, or else to migrate to more favourable districts, whereas along the coast the snow does not lie so long and is swept away from the moors. Birch-twigs can be regarded as at best a substitute food, whereby the grouse can stay the pangs of hunger and live through the winter, but it would scarcely be satisfying in the long run. The Norwegian willow-grouse has until now been free from the parasite *Trichostrongylus pergracilis*, which is so dangerous to British grouse. This may be because the Norwegian birds do not eat much ling (*Calluna vulgaris*), which, as Leiper has shown, harbours this parasite. It now appears, however, that in the coast districts of Norway, Calluna does often serve as food for the grouse, so that increased effort should be made to prevent the introduction of British birds.

A SPECIES OF MONILIA ASSOCIATED WITH SEVERE ANÆMIA.—European residents in the tropics frequently suffer from a chronic or intermittent intestinal disturbance, in which amœbæ or dysentery bacilli are not found, to which the sufferers give the name "sprue." If this is a true infectious disease, an active agent is still to be sought, and therefore considerable significance attached to the work of Ashford in Porto Rico, in which it was suggested that the micro-organism *Monilia psilosis* was responsible for the symptoms. Lawrence Weld Smith, of the Department of Pathology and Bacteriology, University of the Philippines, now publishes in the *Philippine Journal of Science* (April 1924, vol. 24)

notes upon eight cases of severe anæmia associated with the sprue syndrome in which *Monilia psilosis* Ashford has been isolated.

A BIOCHEMICAL BASIS TO DISEASE RESISTANCE.—In Œnothera, resistance to mildew disease is inherited as a unit factor. Marañon has therefore used this species mainly in an investigation, described in the *Philippine Journal of Science* for April 1924 (vol. 24, pp. 369-441), in which a preliminary comparison is made of the biochemical constitution of disease resistant and susceptible strains. The conclusion is reached that the resistant strains are characterised by higher tannin content and more water-soluble acid, whilst immune forms are comparatively high in total nitrogen and total ash, the nitrogen increase being mainly in amino-acids and nitrogenous compounds of non-basic character, the ash increase in calcium and sulphur. Examination of disease resistant and susceptible strains of *Syringa vulgaris*, *Desmodium canadensis*, and *Solidago canadensis* is said to give concordant results.

AN EXPLOSIVE FRUIT.—The beautiful purple flowers of the South European species of toothwort, *Lathræa clandestina*, must have been noticed by many visitors to the London parks; parasitic on elm or other trees and flowering freely in May, it is to be seen in Regent's Park, in the Bedford College grounds, at Kew, and at the Royal Botanic Society's garden. In the Quarterly Summary of the last body (for October 1924) the Curator, Mr. J. L. North, has an interesting note upon the seed dispersal of the plant, which fruited freely in the Royal Botanic Society's garden this summer. He was surprised to notice the force with which the seeds were scattered by the explosion of the capsule when squeezed between finger and thumb. Although the capsule is born at ground level, the seeds are shot out so violently that when, with the assistance of Prof. Gates, their flight was followed and distances measured, some of the seeds were found to have travelled 27 feet. This may throw some light upon the dispersal of the plant in the garden; originally planted upon the root of a beech tree, it has now spread to the roots of other plants to a distance of 40 yards on either side.

A NEW VIEW OF SOIL FERTILITY.—Prof. W. F. Gericke of the University of California certainly seems to have developed a refreshingly novel point of view in relation to the problem of soil fertility, to judge from a preliminary note published in *Science* for April 4, which has just been brought to our notice. Pointing out that the rapid growth of a crop often produces a temporary depletion of some essential soil constituent, he investigated by the water culture method the effect upon the growth of a plant of a period in which the salt supply provided lacked one essential element. The striking result was obtained that after plants had grown for one month in complete nutrient solution, a great enhancement of growth, increase in weight, and advance in date of maturity resulted from the transfer to solutions *devoid of potassium*. In the light of these experiments Prof. Gericke attempts a reinterpretation of the results obtained by Stewart (Journ. Agr. Res. 12, 311-368, 1918), in which it was shown the barley crop very rapidly depleted the soil of nitrogen in the cases where large crops were obtained. From other water culture experiments Gericke had reached the conclusion that the presence of the nitrate ion materially affected the availability of the potassium ion to the plant, and he therefore inclines to associate these large yields in soils early depleted of nitrate with these new experiments in which lack of available potassium after the first few weeks of growth favours increased growth and yield. Needless to say, potassium, and indeed the full supply of nutrients, proves to be essential during the first few weeks of the plant's growth. Prof. Gericke reports similar improved development and yield in plants transferred, after four weeks in full mineral solution, to media devoid of phosphorus (*Science*, September 26).

THE PATHS OF CYCLONES.—The *Monthly Weather Review* for June contains an article by J. W. Sandström on "Investigations relative to the Polar Front," translated from *Meteorologische Zeitschrift* for February by Mr. W. W. Reed. It deals chiefly with "cyclonic families," and an attempt to apply the theory to practical weather service work. The theory asserts that after the passage of a cyclone, each succeeding depression has its path somewhat to the south of that of the preceding one until the cyclones move tangentially to the tropical belt of high pressure. The first members of the family appear in high latitudes. The theory is a consequence of the polar front conception put forward by Prof. J. Bjerknes. When the path runs in the vicinity of the tropical "high," a new cyclone family, it is said, appears in the north and behaves in the same way as the disturbances of the earlier family. The author, on the basis of this law, sought to draw in advance the paths of coming storms; he soon found that the storms followed quite different paths. An investigation was made on the basis of Hoffmeyer's charts. The first test failed to show that the succeeding cyclone lies more often to the south than to the north. The tracks of disturbances from Hoffmeyer's charts showed that the paths often intersect the paths of earlier disturbances in all kinds of ways. The author is of opinion "(1) that cyclone families in the Bjerknes sense do not exist, (2) that the behaviour of cyclones is not regulated by a polar front, and (3) that the discontinuity, which is called the polar front, appears, in general, only with the cyclones and is a result of their activity."

HISTORY OF OPTICAL GLASS.—In any historical appraisement of the makers of optical glass one name alone stands proud of all others—that of Pierre Louis Guinand. Endowed neither with riches nor education of a conventional kind, he converted a haphazard process of selection, which failed to satisfy the cravings of opticians, into a definite industrial art, the essentials of which constitute the universal practice of the present day. At the request of the German optician Utzschneider, Guinand in 1805 left his home in Switzerland to establish at Benediktbeuren an optical glass works, upon the success of which the fame of Utzschneider's firm and its productions quickly extended. According to the investigations of Dr. M. v. Rohr, published in the issue of *Die Naturwissenschaften*, September 26, it would appear that Joseph Fraunhofer, a young artisan in the glass-grinding shop, who had already won the good opinion of his employer, was transferred to the glass works in order that he might master the methods of Guinand. Two years thereafter he was placed in complete control—Guinand, the old experienced and renowned man of sixty-three, was made subordinate to the ambitious youth of twenty-five. Guinand returned to his old home in Le Brenets, and after the termination of his agreement with Utzschneider recommenced the labour of his life. His process was established by the Guinands and their associate, Bontemps, in France and Britain, where the manufacture has flourished and endured. In Germany the industry ultimately declined and entirely disappeared. Thus the ascendancy passed

from Germany until, in 1884, works were established by Abbe and Schott in Jena, where the process of Guinand is once more practised.

THE PHOTOELECTRIC EFFECT WITH MINUTE MERCURY SPHERES.—Dr. E. Wasser, in the *Zeitschrift für Physik*, September 12, describes an investigation of the photoelectric effect, using submicroscopic mercury spheres produced by evaporation and subsequent condensation in dry nitrogen and carbon dioxide. The particles were observed in an electric field with an Ehrenhaft condenser, the field being so adjusted that the observed particle remained suspended in the gas. Light of wave length $\lambda = 275\mu$ was employed to produce the photoelectric effect, and it was found that, up to about $1{\cdot}2 \times 10^{-5}$ cm. radius, the spheres were negatively charged, or there was an inverse photoelectric effect. From this radius up to $1{\cdot}9 \times 10^{-5}$ cm. some particles are charged positively and some negatively, while above $1{\cdot}9 \times 10^{-5}$ cm. radius all are charged positively. The magnitudes of the charges which the spheres acquire seem to depend on the radius; with small spheres charges of $0{\cdot}6 \times 10^{-10}$ electrostatic units, or about one-eighth of an elementary quantum, are much more frequent than charges equal to that of an electron; above 3×10^{-5} cm. radius, charge alterations down to about half the charge of an electron were observed. It is shown that these effects are not due to ionisation of the gases. The question whether the photo-effect has its origin in the adsorbed gas on the surface of the mercury, or in the interior of the metal, can only be answered when it is possible to investigate the same test particle with different gas pressures.

ELECTRIFICATION DUE TO BUBBLING GASES THROUGH FLUID METALS.—Messrs. A. Coehn and E. Duhme describe a series of experiments in which hydrogen, nitrogen, carbon dioxide, oxygen, and ammonia are bubbled through pure mercury and dilute amalgams (*Zeitschrift für Physik*, September 17). All these gases behave alike, and leave pure mercury negatively charged, while weak amalgams of "non-noble" metals (sodium, zinc, cadmium) are positively charged; "noble" metals (tin, copper, silver, gold) do not produce this reversal of sign. Lenard has concluded that, in the case of non-metallic fluids, the function of the bubbling gas is to break up the electrical double layer at the surface, and to carry off the charge which is least firmly held by the fluid. It appears that with pure mercury the electrons are held by the metal which remains behind more firmly than the positively charged mercury particles, which are carried off by the gas as a fine dust, giving it a positive charge. The effect with amalgams depends on the position of the metal employed in the electric tension series; a sodium atom, for example, gives up an electron to the mercury; and it must be assumed that the Na^+ ions bind Hg atoms, forming large $Na^+(Hg)_n$ complexes, which are less easily carried away by the gas bubbles than the corresponding negatively charged mercury particles. Thus the fine dust carried away by the gas must consist mainly of pure mercury; this is not necessarily the case with amalgams of the "noble" metals.

THE DOPPLER EFFECT AND CANAL RAYS.—When the light from canal rays is observed spectroscopically, the spectral lines are seen to be widened, owing to the different velocities of the radiating atoms. Dr. H. Krefft has photographed the β line of hydrogen under different conditions, and has measured photometrically the blackening throughout the band (*Annalen der Physik*, Aug.). He finds that the Doppler band is separated from the line which comes from atoms having small velocities; and that the intensity curve of the band has in general two maxima. The velocities corresponding to these are related, when the discharge voltage is above 40,000, not as $\sqrt{2} : 1$, as is the case with the spark lines of oxygen and nitrogen; the ratio being larger than 2 : 1, and increasing with the voltage. Previous observers have found a limit for the Doppler effect when the voltage is raised sufficiently; but Krefft, who has used voltages from 1400 to 70,000, finds for the higher voltages that the effect increases regularly, proportionally to the square root of the discharge voltage. The difference between the velocity distribution, as determined by the Doppler effect, and the curve for that of the positive H atoms, as determined by electromagnetic analysis, is shown to be a necessary consequence of the facts that the carriers of the Balmer lines have no charge, and that the ratio of the numbers of positive and of neutral atoms depends on the velocity. With the spark lines of oxygen and nitrogen, where the "carriers" are the positive atoms, the two curves are nearly the same; and the two maxima of blackening indicate a velocity ratio of $\sqrt{2} : 1$, which is consistent with the assumption that the lower velocity is produced by the movement of a molecule with positive charge through the same voltage drop that produces the higher velocity in the positively charged atom. The oxygen spark line $\lambda = 4591{\cdot}6$ indicates extra high velocities, which must be due to the fall of doubly charged oxygen atoms through the discharge space.

MOBILE COMPONENTS OF CRYSTALS.—In Band 18, Heft, 1 of Eucken's *Fortschritte der Chemie, Physik und physikalische Chemie*, 1924, Dr. Hüttig contributes an essay with the somewhat curious title: "Uber Gitterbestandteile die im Kristallgitter vagabundieren." It is pointed out that in some cases the particles in a crystal lattice, besides oscillating about positions of equilibrium, may move through the lattice, and the rapidity with which this motion takes place will influence the pressure-composition curves when a volatile constituent is withdrawn from a system. A selection of such curves based on very recent experiments is given, and these are divided into three groups. In the first group, *e.g.*, H_2O/LiCl, the solid residue consists of a mechanical mixture of definite compounds, and the phase rule applies in the simplest form. When a single compound is present, the pressure curve drops vertically towards the composition axis. In the second group, *e.g.*, H_2O/WO_3, H_2O/Sb_2O_5, H_2O/SiO_2, the behaviour is intermediate between those of the first and third groups. In the third group, *e.g.*, O_2/UO_2, H_2/Li, and H_2O/Al_2O_3, the curve sinks continuously without any steps or changes of direction. The laws of solution can be applied to the examples in the third group, and the whole curve covered by an equation $\log(p_0/p) = k/n$, where p, p_0 are the vapour pressures of the solution and of the pure volatile constituent, respectively, n the simple molecular weight of the volatile constituent, and k a constant. It is mentioned incidentally that X-ray experiments have shown that some so-called "colloidal hydrates" contain definite compounds. Thus, white tungstic acid does not show the spectrum of WO_3, and is presumably not a mere colloidal association of H_2O and WO_3.

ERRATUM.—We regret that in our reference to Early Christian legends in India (NATURE, October 4, p. 515) by a slip Malabar was substituted for Mylapore in the last sentence. Mr. Frederick Fawcett, who writes to point out the error, states that while the legend of St. Thomas is very much alive at Mylapore and on the west coast, it does not occur in the Malabar district of British India. He adds that the legends of St. Thomas on both the west and the east coast agree in a remarkable manner.