The Vegetation of Kamchatka.[1]

THE vegetation and flora of Kamchatka are still very little known, and the book by V. L. Komarov, recently published by the Russian Academy of Sciences, is therefore of considerable interest. The flora of Kamchatka may be divided into three groups: (1) That of central Kamchatka, with its spruce and larch forests; (2) flora typical of the peninsula, for the greater part composed of *Betula Ermani*; (3) the subalpine and alpine flora. The variety of species is limited, phanerogamous plants and filicoids together scarcely exceeding 780 species. This peculiarity is chiefly due to severe climate and frequent volcanic activity.

The main portion of Kamchatka is stocked with plants of alpine and subalpine character, but the vegetation of the plains, represented by coniferous forests, may be found around the valley of Kamchatka River. Larch groves consisting of *Larix dahurica* Turcz. are replaced by forests of *Picea ajanensis* Fischer. The larch attains its maximum growth in the driest parts of river alluviums. The spruce of Ajan prefers mountain slopes, and is frequently interspersed with aspen and white birch; its boundaries are not known. The larch emerges from the valley in three places only, namely, at Kronotzk Lake, in the region of the lower course of the Kamchatka River, and near the foot of Glavny Khrebet. *Populus tremula* L. is found with the above-mentioned species, but its distribution is strictly confined to the central region. Erman birch composes the rest of the Kamchatka forests. It grows on the borders of forests near the river of Three Sisters and spreads as far as the Isle of Koraginsk.

The wide-spreading crowns of the birches prevent them from growing close together, leaving sufficient room for development of a dense carpet of herbaceous plants. The normal growth of Erman birch is impeded by heavy snowfalls. It avoids alluvial soils, and is invariably found near the sea-shores, where it suffers from wind, frequently forming impassable thickets. The white birch, similar to the Japanese variety (*Betula japonica* Sieb. var. *kamtschatica* (Rgl.) H. Wiucl.), grows in alluvial soils and is an integral item of mixed coniferous forests.

The subordinate part of the Kamchatka forests consists of the bird-cherry, the sorb, the hawthorn (*Cratægus chlorosarca* Max.), while the riverside forests are composed of *Alnus hirsuta* Turcz., *Populus suaveolens* Fisch., *Salix macrolepis* Turcz., *S. sachalinensis* Fr. Schmidt, and *S. Gmelini* Pall.

Shrubby brushes are also widely distributed in Kamchatka. The first place among them is occupied by alder plots (*Alnus fruticosa* Rupr. var. *Kamtschatica* Rgl.). Its branches are usually pressed to the ground, forming densely interlaced thickets. *Pinus pumila* Rgl. occupies the second place. It grows in the same manner as the alder, attaining the height of 5 metres in the forests, and decreasing to 1 metre on mountain ridges. The third place is occupied by *Sorbus sambricifolia* Roem., which forms close walls and attains its maximum height at the upper border of the mountain forests. *Spiræa Salicifolia* L. and *Rosa amblyotis* Cam. are frequently found in large river valleys.

The following shrubs are found growing in groups: (1) *Lonicera cærulea edulis* Turcz., (2) *Spiræa betulifolia* Pall., and *S. media* Schmidt, (3) *Salix fuscescens*, *S. oblongifolia*, *S. Pallasii* Anderss., (4) *Lonicera chamissoi* Bge., (5) and, more rarely, *Daphne kamtschatica* Max. Dwarf forms of willow are encountered in the Alpine region; amongst them are *S. berberifolia* Pall., *S. arctica* Pall., *S. chamissonis* Andrss., *S. cuneata* Turcz., and *S. reticulata* L. var. *orbicularis* Andrss.

The herbaceous plants *Filipendula*, *Heracleum dulce* Fisch., *Senecio palmatus* Pall., and *Urtica angustifolia* Fisch. develop fully, reaching great heights in the vicinity of river banks. *Angelica ursina* Max. is found on dry meadows. The *Calamagrostis Langsdorffii* Trin. are the most developed of the gramineous herbs, but *Spiræa salicifolia* L. and *Carex Lyngbyei* are also abundant. Groups of *Fritillaria kamtschatcensis* Gawl. are found in dry meadows, and *Lilium avenacium* Fisch. at the outskirts of forests.

The prevailing species of the alpine flora are the following: *Arnica*, *Diapensia*, *Hierochlæ*, *Papaver*, *Alsine*, *Dryas*, *Pedicularis*, *Saxifraga*, *Rhododendron kamtschaticum* Pall., *Phyllodoce*, *Bryanthus*, *Loiseleuria procumbens* Desf., and *Cassiope lycopodioides* G.

Though from a botanical point of view Kamchatka may be considered as an island, it has no sharply defined endemic vegetation. The flora is far from being unique, consisting mainly of circumpolar plants. Violent volcanic catastrophes and ice masses have displaced and deteriorated the ancient vegetation, which united the flora of Kamchatka with the neighbouring parts of America and Japan. The coniferous forests of the centre are the sole remains of floristic antiquity. After the glacial period Kamchatka was stocked with Arctic elements from Anadyr, or from shores which were elutriated by sea currents. Plants migrated from the continent are found on the north-west shore, while plants carried over from Japan are encountered in the southern part of the peninsula. Scarcely more than 50 species, or 6 per cent of the whole flora, are typical or endemic species, which are peculiar to Kamchatka. About 380 species, or 50 per cent of the whole flora, are represented by species bearing close affinities to European plants. There are only 25 species, or 3·73 per cent, which are found in America. These are confined to the narrow strip of the Bering Sea shores. The number of species indigenous to the country is 752: *Filicineæ* 42, *Coniferæ* 5, *Monocotyledons* 240, *Archichlamideæ* 291, *Metachlamydeæ* 174. The remaining 40 per cent are those of eastern Asia. *Cyperaceæ* and *Compositæ* occupy the first and the third places, respectively, among the largest of families. This obviously indicates the comparatively great marshiness of the country.

The book contains a full list of the plants of Kamchatka, with keys for their determination and specific diagnoses.

[1] "Flora Peninsulæ Kamtschatka." By V. L. Komarov. Pp. 339+13 plates. (Leningrad: Academy of Sciences, 1927.)

Triangulation of France.[1]

THE old triangulation of France is considered as having been begun in 1811 by a body of military surveyors known as 'Ingénieurs Géographes.' The work, however, was really a continuation of that executed by Delambre and Mechain between 1792 and 1801, when the old Arc of Meridian was measured from Dunkirk to Barcelona. Under Brousseaud, Bonne, Hossard, Levret, Perrier, and other 'Ingénieurs' of the Dépôt de la Guerre, the triangulation was carried over France and linked with the surveys of Italy, Belgium, Britain, and Germany. The origin for latitudes, longitudes, and azimuth was taken at the Panthéon, whence geodetic latitudes and longitudes

[1] *Bulletin Géodésique*, No. 12 and No. 16, "Formules pratiques pour le calcul des coordonnées géodésiques." By Lieut.-Col. E. Benoit. (Paris: J. Hermann; 1926 and 1927.)

were computed throughout the country from the sides and angles of the triangulation.

Puissant, following Legendre, had derived expansions for working up these extended latitudes, longitudes, and azimuths, but unfortunately the engineers had limited the expansions to terms of the second order. The result was that the errors due to computation alone frequently amounted to 0·03″, say 1 metre.

The object of the methods set out in the two numbers of the *Bulletin Géodésique* is to bring these old formulæ of the engineers into line with modern accuracy. In a preface by General Perrier it appears that the methods were devised at Saigon in 1905 by Lieut.-Col. E. Benoit. The latter has not only modified the old spheroidal factors, always tabulated, but has also introduced corrections to the terms last computed, so as to take the terms of the third order into the reckoning. These corrections are calculated by the aid of two supplementary tables, II. and III. The result is that the maximum error in latitudes below 70° is reduced to 0·002″, say 2½ inches, even when the side of the triangulation is 60 miles in length.

In *Bulletin* No. 12 the methods of derivation of the formulæ are described and the spheroidal factors are tabulated for every 10 sexagesimal minutes of the quadrant. In No. 16 the same factors are shown on the centesimal system, the figure of the earth employed being that of Hayford. The author is to be congratulated on the success of his accomplishment; the formulæ now rank with others of modern times.

G. T. McC.

University and Educational Intelligence.

LONDON.—The Rhodes Trustees have made a donation of £5000 to the fund which Mr. F. C. Goodenough is raising in order to build a Hall of Residence for Overseas and British Students at the University, and have provisionally undertaken to set aside a sum of £5000 towards the building of a Students' Union.

The following doctorates have been conferred: D.Sc. in medical statistics on Mr. Major Greenwood, University professor of epidemiology and vital statistics, for a thesis entitled "Laws of Mortality from the Biological Point of View"; D.Sc. (engineering) on Mr. J. N. Long (Imperial College, City and Guilds College) for a thesis entitled "Heat Transmission: A Series of Investigations into the Phenomenon of Heat Flow in an Air Stream, in relation to some of its Industrial Applications."

Prof. L. N. G. Filon has been appointed for a period of five years to be Director of the University Observatory, and Mr. C. C. L. Gregory to be Wilson observer at the Observatory.

WE have received from the Rhodes Trust a copy of a statement for the academic year 1927–28 regarding the Rhodes scholarships. The number of scholars regularly resident at Oxford during the year was 187, namely, 94 from the British Empire and 93 from the United States of America. Natural science and medicine claimed 43 of them, mathematics 7, and economics 7. Among distinctions won by former Rhodes scholars, mention is made of the following appointments: J. J. Tigert (Tennessee), lately United States Commissioner of Education, to be president of the University of Florida; S. K. Hornbeck (Colorado) to be Chief of the Division of Far Eastern Affairs in the Department of State, Washington; and P. H. Rogers (New South Wales) to be a Justice of the Supreme Court of New South Wales. Thirty-one of the Rhodes scholars represented Oxford against Cambridge in athletic contests, and three represented their Dominions at the Olympic games. Of 37 books known to have been published during the year by Rhodes scholars, twenty-five were published in the United States, eleven in the British Empire, and one in Germany. Only three were on scientific subjects.

SCIENCE teaching in rural secondary schools in America is criticised by the professor of rural education, Cornell University, in an article published in the September number of *School Life*, an official organ of the United States Bureau of Education. Teachers have, in general, been too intent upon "drill in dry facts and principles of a formal science which creates no enthusiasms and which should follow an interesting initiation." There has been a general disregard of the connexions between the science studied and the economic, social, æsthetic, and other aspects of rural life, the courses of study and text-books having been planned and written largely from the point of view of the city and its institutions. In the same number of *School Life* another aspect of science teaching is discussed in an article on "Social Hygiene Work by the Parent Teacher Associations." The value of the study of biology has lately been emphasised by the National Congress of Parents and Teachers and American Social Hygiene Association. These bodies are actively engaged in promoting the systematic instruction of children in the facts of human reproduction, and a pamphlet has just been issued by them in which these facts are presented in such a way as to help parents to take their proper share in this task, for which, moreover, parent-teacher study groups are organised for reading and monthly discussions on such topics as "The Way Life Begins," "Sex and Social Health," etc.

SPEAKING of "Science, Industry, and Humanism," in the Taylorian Lecture, 1928 (Oxford: Clarendon Press, 1928), Dr. Abraham Flexner enlarged upon the peculiar function of humanism as the assessor of values. Science and industry have in the past two hundred years transformed the face of the civilised world and profoundly modified human conceptions of the past, present, and future, but neither science nor industry, as such, is concerned to consider in respect of any of its doings, whether it makes for the weal or the woe of mankind. It is for the humanist to elaborate a rational system of values appropriate to the conditions not only of past ages but also of to-day and to-morrow, and thus to influence the direction of human development; and in proportion to the magnitude of the changes wrought by science and industry is humanism's burden heavy. Science has vastly enlarged the scope of human knowledge, human effort, human thought, human imagination: it has given wings to the human spirit. But it ministers also with absolute impartiality to the worst that is within us. Humanism must, it is true, use scientific method in procuring data, in generalising and in interpreting, and in the last century the scientific side of humanistic studies has been strongly emphasised, but the attitude of detachment and indifference proper and necessary to science, must give place in the humanist to the attempt to see things in perspective, to measure, albeit tentatively, the works and doings of the human spirit, scientific, practical, and humanistic as well. The humanist is the custodian of the human ideals evolved through the ages, and he fails to rise to the height of his opportunity if he shrinks from attempting to appreciate the situation of the world of to-day.