through the ice pack, gazes at the great glaciers of Greenland, picks flowers beside a snow bank retreating in the brief Arctic summer, and begins to understand the fascination of the far North, the friendliness and warmth of the northern people, which calls the MacMillans back year after year.

The rich personal interest of her story, written much as she would tell it to a friend, makes the book easy to read, but this is well-balanced with a great deal of information about the northern lands, their people, their history, and the interesting work undertaken by the little *Bowdoin* and its student crew.

One criticism of the book is the omission of the dates on which the expeditions she describes occurred. The only indication as to when these took place is on the last pages where she mentions that the war put a stop to them when the government took the *Bowdoin* and sent her north under Naval command to conduct hydrographic survey work in Greenland waters. This omission does not hamper the reading qualities of the book, but seriously detracts from the historical value of her record of these expeditions and the fund of local and detailed information she has given. The book is nevertheless a valuable addition to arctic literature and will find a place on bookshelves of arctic travel and adventure.

DAVID C. NUTT.

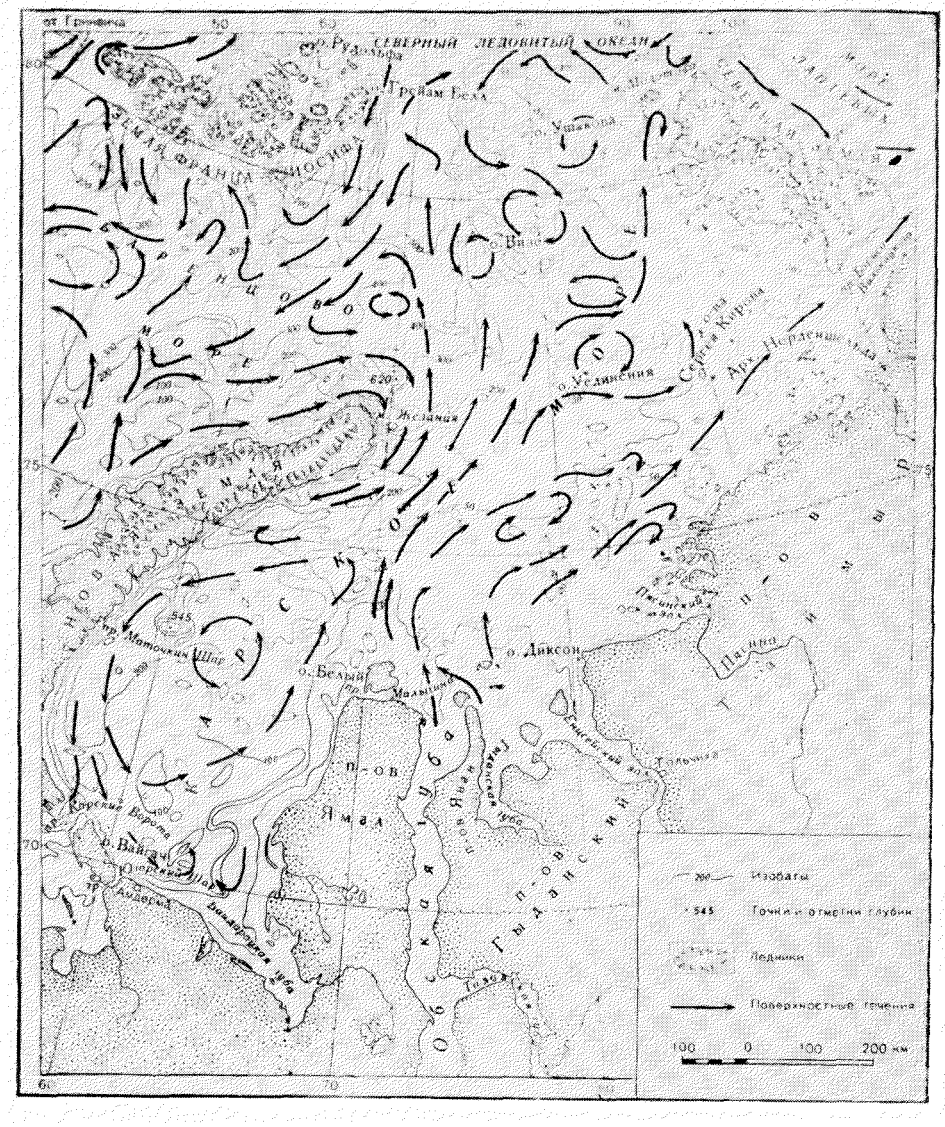
FIVE BOOKS ON THE SOVIET NORTH.

By D. B. SHIMKIN, Russian Research Center, Harvard University.

The Soviet Union has an outstanding reputation for the extent and quality of its researches on the Arctic and Subarctic. Unfortunately, evidence substantiating this reputation has generally been unavailable to North American polar workers. Consequently, it is the purpose of this paper to throw light upon the recent status and current problems of some aspects of Soviet Arctic and Subarctic research by reviewing briefly five representative and significant books. They include: S. P. Suslov: *Fizicheskaya Geografiya SSSR* (Physical Geography of the USSR), Uchpedgiz, Leningrad-Moscow, 1947, pp. 544 + Atlas (VIII Maps); G. D. Rikhter: *Sever Evropeiskoi Chasti SSSR* (The Northern Sector of European USSR), Gosizdgeoglit, Moscow, 1946, pp. 192 + 2 maps; S. D. Lappo: *Spravochnaya Knizhka Polyarnika* (Polar Handbook) Izd. Glavsevmorputi, (Moscow), 1945, pp. 423; N. N. Zubov: *L'dy Arktiki* (Arctic Ices), Izd. Glavsevmorputi, Moscow, 1945, pp. 360; and A. A. Grigoryev: *Subarktika* (The Subarctic), Akademiya Nauk, Moscow-Leningrad, 1946, pp. 171. Although all of these volumes include a wealth of factual data, supported by pertinent tables and bibliographies, the first three may be regarded as being primarily descriptive; the last two, primarily analytical and theoretical in character.

Suslov's treatise is limited to the Asiatic part of the Soviet Union; nearly half of the book deals with Arctic and Subarctic territories. Thus it provides, in conjunction with Rikhter's monograph on the European North, a basic coverage of the general geographical characteristics, geological history, geomorphology, hydrography, climatology, pedology, and plant and zoo-geography of all of the Soviet North excluding Novaya Zemlya, Franz Josef Land, and the northern half of the Barents Sea. It should be noted that in Suslov's work, as in other publications, information is scantiest in regard to the Bering Sea littoral, particularly the Koryak Range, as well as the Eastern Siberian Plateau lying between the Yenisei and Lena basins.

Suslov's volume maintains an excellent level of presentation, with clearcut discussions of physiographic and ecological interrelations, and with an abundance of illustrative materials. In my opinion, the most brilliant section is the characterization of the peculiarities of the Lena Basin and Northeastern Siberia primarily as functions of the climate, permafrost and the hydrographic regime (pp. 131-133 ff). I should also like to draw attention to the atlas, which reproduces maps previously available only in Volumes I and II of the Great Soviet Atlas (*Bol'shoi Sovietskii Atlas Mira*); furthermore, the



Reproduction of Fig. 5 showing ocean currents, bathymetric data and ice-caps: from *Fizicheskaya Geografiya SSSR*, p. 26.

geological and soil maps of the USSR incorporate subsequent changes. The weaknesses of the work, as a general survey, are minor. Thus it was unavoidable in a volume, the publication of which has been delayed since 1941, that Sumgin's recent extensions of permafrost almost to Vladivostok be omitted (cf p. 143). On the other hand, the neglect of recent climatic changes in the Arctic and Subarctic, and the use without qualification of climatic charts based upon the cold period 1881-1915 (e.g., p. 135), are definitely regrettable, especially since Suslov has brought forward some new facts applicable to this problem. For example, he notes (p. 88) that the Altai glaciers have been receding for the past twenty to thirty years (i.e. up to 1940) at rates ranging from 8 to 19 metres annually. Even more rapid recession is under way in the Central Asiatic glaciers, from 282 to 1200 metres between 1881 and 1932 (page 503.)

Rikhter's brief volume on North Russia is closely comparable to Suslov's in organization and quality. In some sections, particularly in meteorology and faunal ecology, his treatment is more thorough. Noteworthy is his inclusion of maps showing the northward advance of the European hare (*L. europaeus*) and the simultaneous retreat of the reindeer (*R. tarandus*) in Russia over the past century (pp. 90, 95). I also appreciate his association of bird and mammal species with distinctive elements of the landscape, a fact of great importance in understanding the discontinuities of faunal distribution. At the same time, the virtual neglect of fishes is a major oversight, particularly in view of the many excellent studies which exist on this subject, (e.g. L. S. Berg's *Zoogeographica 1*: 107-208, 1932). The omission of scientific faunal names, (even from an appended glossary), also restricts the usefulness of this presentation.

Lappo's polar handbook differs sharply in content and approach from the two volumes discussed above. A collective work, it may be described as an encyclopedic dictionary of concepts and terms significant for explorers and workers in Arctic seas. It covers hydrography, land forms, ice, climate, geophysical phenomena, invertebrate and vertebrate fauna, population and administrative divisions. In addition, it has seventeen appendices, including important though incomplete data on the annual flow of rivers, tides, magnetic deviations, and conventional hydrographic symbols employed in the USSR; an excellent bibliography, and an index. This work represents an indispensible key to the accurate utilization of a variety of Soviet scientific publications. It summarizes much new factual information. For instance, the map on vegetation zones in the Soviet Arctic (p. 81) differs considerably from those compiled in the Great Soviet Atlas and Suslov's volume both in boundaries and in groupings. Thus it introduces new tundra subzones: "arctic deserts" and "arctic glacial deserts". Its treatment of fauna is outstanding, especially its characterization of the faunal composition of the Soviet Arctic seas (pp. 269-272). Evidence is adduced of Atlantic influences in the Kara Sea, coming in large part from north of Spitzbergen and Franz Josef Land and thus by-passing Barents Sea; of the almost purely Arctic nature of life in the East Siberian Sea; and of the significance of dispersion from the American Arctic and Bering Sea throughout most of the Chukchi Sea.

The highly compressed treatment of data in Lappo's book is often tantalizing. For example, until Borisov's sensational discovery of the chum salmon (*O. keta*) in small quantities in the Lena River in 1928, no members of the genus Oncorhynchus were believed to exist northwest of Bering Strait. Lappo now reports (p. 274) that not only the chum but the pink salmon (*O. gorbuscha*) are found in the Lena, Kolyma, and Indigirka Rivers. Does this indicate a recent increase in numbers or, even more important, an extension of range? That is not discussed.

Lappo's section on geophysics is weak, failing to include any treatment of ionospheric concepts. I hope that this and the antiquated, sketchy discussion of population and ethnic groupings will be thoroughly revised in future editions of this most valuable handbook.

Zubov's monumental book on arctic ice represents one of the finest contributions to science which it has been my pleasure to read. In my opinion, it deserves painstaking study by all specialists on the Arctic, not only oceanographers but also climatologists, geologists, glaciologists, biologists and others. It incorporates a profound digest of the findings of Russian and foreign investigators, such as Sverdrup, Stefan and Weyprecht, enormous masses of hitherto unpublished Soviet observations, and prolonged personal experience. The volume is organized into thirteen chapters, which illustrate the breadth of Zubov's treatment: the characteristics of sea-water, temperature and salinity changes of the ocean, the mixing of ocean waters, ice formation and the typology of marine ices, the physical and chemical characteristics of marine ices, the growth of ice, the deformation of ice, the melting of marine ices, tidal action on ice, ocean currents and ice, winds and ice drift, the water and ice circulation of the Arctic

basin, and seasonal and secular variations in the intensity of ice formation. Throughout the book there is a cautious and tempered balance between quantitative formulations and express recognition of the immense complexity of the general and special problems involved in the topic of ice. It is clear that this complexity bars any single formulation applicable to the prediction of ice conditions regardless of local geographical factors. At the same time, the dominating vectors in a given region are usually sufficiently few and sufficiently decisive to permit the development of appropriate predictive techniques. Thus for the central Arctic basin, away from land masses and shoals, Zubov reports the discovery of two basic rules determining the direction and velocity of ice drift: ". . . the pure wind drift of pack ice is directed along isobars, with the condition that the high-pressure area is on the right, and the low-pressure area on the left, of the direction of drift (p. 276)". Furthermore, the velocity of drift is expressed by the formula: "s = 13,000 dr/dx, where s is the mean velocity of the ice in kilometers per month, and dr/dx is the gradient of pressure, expressed in millibars per kilometre, and taken from the monthly pressure map (p. 278)."

In contrast to the significance of wind drift in the central Arctic, tidal action is of great importance in the Barents Sea, delaying the initial formation of ice, hindering the development of shelf-ice and icefields, but increasing the amounts of both bottom and total ice formed in the region (p. 247). Cotidal lines are particularly important in the formation of fracture zones in ice packs (pp. 253-255). The ice problems of the shallow Siberian seas, without strong currents or tides excepting in Khatanga Gulf, and with prolonged sub-zero weather, low precipitation, and marked inflows of fresh river waters during the summer months, are again peculiar. Here, locally determined, quasi-permanent centres of freezing and thawing are extremely important (pp. 152-3, 239-242). (I should mention that D. B. Karelin's study on freezing centers and freezing waves—*Meteorologiya i Gidrologiya*, 1937, No. 2, pp. 43-50—presents important specific data treated in general form by Zubov.) Zubov also discusses an empirical equation, particularly applicable to the Siberian Arctic seas and tested on Dikson Island and during the Sedov drift, relating the rate of growth of marine ice to total temperature deficiency (pp. 153-166): $i = 25 + \sqrt{(25 + i_0)^2 + 8\,dR}$, where i is the final thickness of ice in centimeters; i_0 is the thickness of ice in centimeters at the beginning of growth; and dR is the sum of the day-degrees of temperature below o°C. accumulated during the period of ice growth.

Within this brief review, I can but indicate two of the many research problems and new facts adduced by Zubov. A field of current investigation which appears to him to be extremely promising for meteorology and ice forecasting is that of the daily amplitude of surface [?] pressure variations (pp. 318-321). Again, the new data on temperatures, salinity and oxygen content presented by Zubov in a few pages of fine print (pp. 300-307) are most useful for biologists.

In contrast to the cautious empiricism expressed in Zubov's work, Grigoryev's monograph represents an attempt at sweeping synthesis of the physical processes and environmental conditions existing in the tundra, his "Subarctic". His hypothesis, in so far as I grasp it, is the following. (1) The fundamental factors determining the processes of erosion and soil formation, and the basic ecological conditions for flora and fauna in an area are the sum and annual variation of solar radiation, a function of latitude. (2) These basic influences are modified by changes in total and seasonal moisture balance resulting from the actions of warm and cold maritime air masses. (3) Consequently, the environmental conditions of the tundra, which exist in North Russia east of the White Sea between 67°06′ and 73°54′ N are found between 72°18′ and 76°30′ N in Eastern Siberia (95° to 140° E), and between 59°30′ and 65°30′ N on the Soviet Pacific Coast. In North Amercia, according to Grigoryev's preliminary data, the Mackenzie Basin most closely approximates Eastern Siberia, while Labrador corresponds more to the Soviet Pacific. (4) Mountainous countries in this

latitudinal zone, such as Alaska, represent special conditions.

Grigoryev's thesis is applied primarily to the North Russian tundra, for which he gives a detailed interpretation of microrelief, soils, flora and fauna in terms of his approach. The other tundra regions are dealt with in much briefer form.

In my opinion, Grigoryev's book marks a major challenge to future research, but his findings cannot yet be accepted as demonstrated. Thus the meagre extent of present knowledge of gross solar radiation, let alone radiation analyzed by wave length, in the Arctic is brought out by N. N. Kalitin's important summary (*Izvestiya Akademiyi Nauk. Seriya Geograficheskaya i Geofizicheskaya* 11:433-439, 1947). Only in 1941 was it possible to develop an approximate picture of the gradation of total solar radiation in European Russia, while in northern Siberia only five stations—Bukhta Tikhaya, Dikson Island, Cape Shmidt, Tiksi, and Uedinenya Island—have been making actinometric observations, for from 5 to 10 years.

To sum up, two trends appear in current Soviet research on the Arctic and Subarctic: a consolidation of past findings in useful descriptive works, and bold attempts to integrate large masses of observed or inferred facts into resultants of basic physical processes. The reports produced are of sound—in Zubov's instance, outstanding—quality. Continued attention to Soviet reports in these fields appears to be of great importance for the effective development of research on the North American Arctic.

EDITORIAL NOTE

The author of *The Great Mackenzie*, reviewed in ARCTIC, Vol. 1, No. 2, has drawn the Editor's attention to what he considers to be an error in the review. He points out that the area of the Mackenzie Basin is usually accepted as being about 682,000 square miles. The reviewer states that it is 125,000 square miles and consequently doubts whether as much as 100,000 square miles can be suitable for farming. The apparent disparity in area of the Mackenzie Basin is due to a difference in definition. The larger figure includes all waters which ultimately drain into the Mackenzie delta, not omitting the Peace, Athabaska, Finlay, and other large tributaries. The reviewer was concerned with the immediate surroundings of the Mackenzie River proper, believing that this was the area being discussed by the author.

EDITOR, *Arctic*.

CORRESPONDENCE

North Pacific Planning Project
Canadian Section
Langevin Block, Ottawa,
January 8, 1949.

Dear Sir,—

I wish to call your attention to an omission in the review of *Canada's New Northwest* appearing in the Autumn number of *Arctic*.

This review states that "*Canada's New Northwest* is largely the work of Mr. R. K. Odell of the Department of Mines and Resources and Mr. W. Maxwell an industrial engineer", whereas in fact the North Pacific Planning Project, including long term field surveys and office studies and the publication of the report, was under the active direction of Dr. Charles Camsell, C.M.G. From the commencement of the North Pacific Planning Project in 1943 to its culmination in the publication of the report in 1948 Dr. Camsell was the active head of the organization and the success of the Project was due to the time and energy he devoted to it.

The various chapters of the report were either based on, or prepared by, authorities on the subject dealt with, and in the Preface their collaboration and advice is acknowledged, thirty-five of these authorities being named.

The Mr. W. Maxwell referred to is Marvin W. Maxwell, Chief of Development of the Canadian National Railways.

I bring these facts to your attention to give credit where it is due and to give proper authority to the report.

Yours sincerely,

R. K. ODELL, *Assistant Director*.