

POLISH ACADEMY OF SCIENCES
INSTITUTE OF GEOGRAPHY

GEOGRAPHICAL STUDIES
No 14

JOZEF STASZEWSKI

VERTICAL DISTRIBUTION
OF WORLD
POPULATION

WARSAW 1957
STATE SCIENTIFIC PUBLISHING HOUSE

POLISH ACADEMY OF SCIENCES

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ВЕРТИКАЛЬНОЕ РАЗМЕЩЕНИЕ НАСЕЛЕНИЯ
ЗЕМНОГО ШАРА

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PRACE GEOGRAFICZNE

№ 14

JÓZEF STASZEWSKI

PIONOWE ROZMIESZCZENIE LUDNOŚCI
NA KULI ZIEMSKIEJ

POLISH ACADEMY OF SCIENCES
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To the memory of my dear wife Julia

To the memory of my dear wife Julia

I. METHODS OF INVESTIGATIONS

The object of this work is to present a picture of the distribution of the world's population in reference to sea level.

To state that different degrees of density exist on the same levels in different geographical latitudes does not signify that surface configuration has played the only decisive role in the shaping of this phenomenon. The author is of the opinion that the mode of life and economy of the population which are conditioned by the development of the productive forces and by the social system are the predominant factor influencing the density of population. Thus the author rejects the determinist point of view. In order to explain so complex a phenomenon as the formation of the differentiated vertical distribution of the population throughout the world, it would be useful to give wide consideration to the development of economic relations and of the social and political system. This lies, however, outside the scope of this work.

There is no doubt that geographical environment and especially the climate in the given geographical latitude is a factor of importance in the vertical distribution of population. Nevertheless this factor is indirect and varies in accordance with the degree of social development prevailing in the given country. It is different in primitive countries — semi-feudal — and different again in capitalist or socialist countries.

Changing social and economic relations frequently lead to changes in the vertical distribution of population. The author has quoted several examples to prove the correctness of this thesis and has described the changes in the density of population on different levels over the past hundred years in countries undergoing profound economic transformations.

The excessively wide scope of this subject and the lack of material have prevented the author from applying this method in the case of all the countries to which reference has been made. In a majority of cases a statistical picture at a given moment has been presented and this may serve as groundwork for further analytical research. The author has established certain world indices which may provide a basis for a comparative description of the map of the world's density of population on a broad statistical and cartographical foundation.

The International Map of the World 1:1,000,000, as well as the French [26] and the Dutch [6] colonial atlases, the Oxford Indian School Atlas [60]

and also sheets of the Map of Asia 1:4,000,000 have been used in the compilation of this work. In principle use has been made of published material. In certain cases, however, there was need to take supplementary measurements, and in this connection the author, assisted by H. Masicka, M. Sc., carried out a series of hypsometrical measurements at the Department of Geography of the Teachers' Training College in Gdańsk. This has been done in the case of Poland, two Soviet republics, eleven other European countries, as well as of 23 non-European countries. Every small administrative region of the countries in question was traced on a hypsometrical map, and an estimate was made of the number of inhabitants on the levels selected, always in comparison with figures obtained from detailed calculations. In the case of higher levels the estimate was based on the number of settlements marked on the given map. Certain figures relating to smaller administrative units have been attained by taking a certain average of the density of population at various altitudes. To do this it was necessary to make planimetical measurements on hypsometrical maps. Despite this most of the figures are merely of approximate value.

All the figures have been reduced to the 1945-1946 period*. In this connection the data relating to certain countries which are now building a socialist system refer to the period when capitalist relations, frequently with marked survivals of feudalism or even earlier social and economic formations, still prevailed (particularly in Asia). Only in the USSR did there already exist a new system in the period under investigation. Therefore there seemed to be no point in making a distinction between the countries of people's democracy and the remaining European and Asian countries.

After dealing with the problems connected with the hypsometry of continents and with the method of calculating the vertical distribution of population, the author proceeded to analyse the present state of the distribution of population on the globe, as well as on particular continents and in certain countries. In the survey of continents, special attention has been paid to mountainous regions.

General tables are appended to this work, showing the vertical distribution of population in all countries throughout the world.

* No reduction to 1950 has been made since no complete 1950 census figures were available at the time when most of the research was conducted.

II. HYSOMETRY OF CONTINENTS

The attempt to give a hypsometrical picture of the entire globe emanated from Eratosthenes's school. In his work "The Cyclic Theory of the Meteora", Cleomedes (I or II century B.C.) described the survey of the earth made by Eratosthenes and concluded thus: "...Therefore the earth's diameter amounts to approximately 80,000 stadia, namely it is slightly less than one-third of the principal circle. Those who claim that the earth cannot be spherical, for it is deformed by the depth of the seas and the elevation of the mountains, are quite wrong. For neither the height of the mountains nor the depth of the seas exceed 15 stadia (appr. 2,700 metres). And the relation of 30 stadia to 80,000 stadia is infinitesimally small. It is as if the surface of the globe were sprinkled with dust..." [14].

Within the precincts of the Mediterranean world, where Eratosthenes lived, the figure of 50 stadia was considered the span of the relief of the fithosphere, and this is fairly accurate. It is possible, however, that this ligure was not the result of measurements, but was more likely an assumption based on a scientist's intuition.

Seventeen centuries after Cleomedes, Laplace, also by means of brilliant intuition, nevertheless on the basis of mathematical calculations, estimated the average height of the surface of the continents at approximately 1,000 metres.

But it was not until the nineteenth century when hypsometrical material was collected, that it was possible to begin exact measurements on a map. The first to do so was H u m b o l d t [30]. But having insufficient material at his disposal and employing the rough method of vertical cross-sections, he obtained poor results, which led to a completely erroneous idea of the real volume of the continents. These are his average heights: Europe — 205 metres, Asia — 351 metres (!), North America — 228 metres, South America — 345 metres, continents in general — 308 metres.

L e i p o l d t [42] used the cross-section method to calculate the average elevation of Europe, and obtained the figure of 290.8 metres. C h a v a n n e s [13] constructed a hypsometrical map of Africa (1:2,000,000) using the 3,555 altitude measurements known at that time, and by the cross-section method calculated that the average height of that continent was 661.8 metres. But this result, as was proved by H e i d e r i c h [29], was only accidentally correct.

The cross-section method has proved fruitless. For the volume of the land mass by itself did not give a true picture of the distribution of the various degrees of elevation, which alone could serve as the basis to draw a hypsographical curve. Only planimetric measurements could provide a solution to this problem. Almost simultaneously in the eighties, the large geographical establishments of those days set out to perform this task. In Russia this was done by Tillo [89], in France by Lapparent [39], in England by Murray [51], in Vienna by Pencik [61] and his collaborator Heiderich [29]. Lapparent's measurements are noted for painstaking care as regards the method and construction of hypsometrical maps. The selected 0—200, 200—500, 500—1000, 1000—2000 and over 2000 metre altitude ranges have proved the most useful and are still employed today as the groundwork for hypsometrical measurements.

Independently of these geographical establishments, hypsometrical measurements were conducted at that time by the U.S. Census Department, for separate states and for the Union as a whole.

The vast hypsometrical material amassed in the first quarter of the twentieth century, which especially in non-European countries and the Soviet Union, completely changed the face of the map and served as the basis for the construction of the International Map of the World, called for a re-examination in order that a hypsographical curve might be drawn. This task was undertaken by Kosinna [35], on the basis of literature of the first inter-war years, and he obtained results which in several cases greatly differed from those obtained previously. In the case of Europe, where lowlands predominate, it was found necessary to consider the contour-line of 100 metres. He calculated Europe's average elevation to be 340 metres. This was unexpected since Wagner's average of 300 metres had been generally accepted.

The latest attempt at drawing a hypsometrical picture of all the continents on the basis of original cartographical material was made by Romer's school. This laborious work was executed by Orlicz [59], who described the method he employed, in the Polish Cartographical Review. However, on levels up to 500 metres his results cannot be compared with others, as Romer's school uses the 300 metre contour-line, instead of 200 metre contour-line despite the principles adopted in the International Map of the World. The upshot of this point of view is that the 300—500 metre altitude range ceases to be a separate unit and is treated rather as an upland slope.

The 100 metre contour-line must be singled out in population geography, especially as regards sea-coast lowlands. The following should be quoted by way of example: Europe, the Ganges lowlands, the Chinese lowland, Mesopotamia and regions of the Amazon. The Dutch and North German lowlands, just as the plain of the River Po, are bounded in their general

outline by the 100 metre contour-line. The area of the Chinese lowland within the 100 metre altitude equals 925,000 sq. km and the 100—200 metre step — only 536,000 sq. km. The Tokio lowland, and the lowland regions of Indo-China [55] and Sumatra [40] are also within the 100 metre contour-line.

Statistical offices have also shown interest in the hypsometry of their own countries. The statistical year-book of Czechoslovakia [82] describes the hypsometry of Bohemia, Moravia and Slovakia in 250 metre divisions. Mongolia's hypsometry has been described in detail by Murzayew [52]. The hypsometry of the Soviet Union on the basis of the 100 and 1,500 metre contour-lines was drawn up on a 1:5,000,000 scale map by V o l k o v [95]. The Bulgarian statistical year-book describes the hypsometry of the country in three provinces — north, west and south. These figures are repeated by V a l e v [91] in his work on Bulgaria.

The G r e e k statistical office [84] carried out a hypsometrical survey of the country according to administrative units. In view of the marked altitude differences of habitation, the American republics too take hypsometry into account. Brazil [3] indicates the hypsometry of particular states. Peru and Colombia indicate the absolute altitude of their countries' departmental towns. The statistical year-book of Turkey also publishes figures relating to the altitude of the country's towns.

Poland's hypsometry in percentage figures both for the 150, 300, 500 and 1,000 metre levels and levels above 1,000 metres are to be found in our statistical year-book (1949). These levels were selected as affording an opportunity to make a comparison with Z i e r h o f f e r's figures relating to pre-war Poland. These results have been revised by the author in order that the altitude ranges may be comparable with those adopted in the International Map of the World.

III. METHODS OF CALCULATING THE VERTICAL DISTRIBUTION OF POPULATION

The vertical distribution of population was not treated as a geographical problem until fairly late. The first steps were to investigate the physiological and economic conditions of the upper limit of the inhabited area. The Alps and the Tatras were the areas of oldest research. K o r i s t k a [34] supplies a list of 62 Tatra settlements indicating their altitude. Still earlier, Humboldt dealt with this problem in reference to Mexico. S c h l a g i n t w e i t [76] treated the vertical distribution of population in the Himalayas on the basis of his own research and that of his two brothers. He compares the highest range of habitation in the Himalayas and Kashmir with the situation in western Tibet, the Andes and the Alps. According to Schlagintweit, permanently populated settlements in the Himalayas go up to 2,830 metres (the Yangma Guola settlement); in Kashmir the highest situated settlement lies at an altitude of 3,583 metres, in western Tibet — of 4,611 metres, in the Andes — of 4,310 metres (Cerro del Pasco).

At the same time D e l i t s c h [16] described the density of the population in Western Germany on a hypsometrical basis.

In the last quarter of the nineteenth century, large-scale research was begun on seasonal habitation in the mountains and on shepherds' movements. The entire vast literature in this field is only of limited value to population hypsometry, as treated in this work. The very conception of an upper limit of seasonal and permanent habitation is unstable and undefined. According to L e h m a n n [41] three different conceptions are to be considered here: 1) the line linking the highest lying settlements in the given mountain system; 2) the average height of this line expressed in the form of a suitable contour-line; 3) the arithmetical mean of the altitudes of the highest settlements. The results of the various investigations cannot be compared unless it is known which of the three possibilities are involved. Of essential importance is also to determine the interconnection between the upper limit of the inhabited area and the upper limit of forest and grain cultivation. In the Caucasus, for instance, the highest settlements with grain cultivation go up to the 2,500 metre contour-line, in the Kansu province, with a harsh continental climate, loess, and with it the highest permanently populated settlements also reach the height of 2,500 metres.

In the eighties, Ratzel and his school began to investigate the numerical

distribution of population according to hypsometrical levels in the Midland Range of Germany. The research carried out in Bohemian and Saxonian Erzgebirge [11], as well as in Schwarzwald [53], is of basic importance here. At the same time, the USA Census Department started a survey of the vertical distribution of population by states. Calculations have been made referring to four Census periods [8], from 1870 onwards. The results are closely comparable and interesting from the methodical point of view. The Vienna school of geographers did a great deal of work in the Austrian Alps; Steinhauser's [85] methodical work constitutes the beginning of this research. Calculations relating to the area of contemporary Austria are supplied by Engemann [19], based on a census of settlements and their heights, and published by the Austrian Central Statistical Board. Swambera's Czech geographical school also provided works dealing with the vertical distribution of population [15]. Under the influence of the Vienna school, this problem was also explored in Serbia [80].

Official population statistics in Switzerland, together with census results, contain data concerning the vertical distribution of population by cantons [83]. There are comparative figures for the year 1888 and the following decades, beginning with the year 1900. Of other Swiss literature, mention should also be made of Meuriot's systematic work [47]. In Bulgaria these problems were dealt with by Ishirkov [32]. The American scientist Bowman [10] investigated the vertical distribution of the population in Bolivia, while the Japanese Komaki [72] marked out the upper limit of habitation in Japan. A detailed analysis of the vertical distribution of population has been carried out by the Greek statistical office [84].

In Italy the problem of the vertical distribution of population has been the subject of very extensive studies based on official census figures which, in addition to the number of inhabitants of communities and villages, also state their elevation above sea level. In the eighties Zampa [97] began large-scale investigations of the influence of absolute altitude on the population's health standards and development. But his endeavours were vain and fruitless since both the state of health of the population and its development are conditioned, first and foremost, by the prevailing social and economic relations. That his investigations were rather unsuccessful, was admitted by Zampa himself. In certain cases he simply gives a statement of fact without establishing any causal relations "...The birth rate", he claims, "amounts to 36‰ in communities situated below 100 metres, 38‰ — on the 100-500 metre altitude range, 40‰ — on the 500-1,400 metre altitude range. Thus, the highest birth rate is to be found in the foot-hills...".

About the year 1900 Marinelli and his school [46] conducted a survey of the vertical distribution of population from a formalistic point of view.

These investigations were continued as late as the thirties, covering many Italian provinces reaching from Tridentina to Campania and Sicily. Some of them provide retrospective material and are important contributions to the problem under consideration.

All these surveys were limited to small areas and proceeded from the premises of demography influenced by Malthusianism. The idea was to prove the relative "over-population" on higher hypsometrical levels and that this over-population is due, above all, to factors of geographical environment, which some geographers have classified as "difficult" and impeding economic activity. But the principal problem has been ignored, namely, that Man having taken the land into possession is able to exploit it in different ways depending on social and economic systems. Habitations in two regions basically alike as regards the conditions of geographical environment may be, and often indeed are, in most cases different; on the other hand, we frequently come across similar kinds of habitation, density and distribution of population in different conditions of geographical environment. Therefore the social and economic system is the decisive factor here. And in all comparative demographic studies it is this factor, first and foremost, that must be considered.

So far, no one has attempted to provide a survey of the vertical distribution of the population of all the continents. Zierhoffer [98] referred to this problem merely programatically. Proceeding from the racial point of view, S a p p e r [73] searched for the upper limit of the distribution of the various African races, and in doing so arrived at results conflicting with his previous claims. Referring to a letter he had received from G i l l m a n [21], he maintained that in Africa, exclusive of Egypt and the Mediterranean Zone, 63 per cent of the population lived above the 1,000 metre level. But the calculations made in this work, based on an analysis of 56 political units in Africa (states and colonies), reveal that this percentage is merely 28.2. This is not surprising, since the problem of vertical distribution of population is hardly known in human geography.

Soviet geographers have also done some work on the problem of the vertical distribution of population. "Voprossy Geografii" [90] published a work by Ustinova on the population of the Altai Mountains, in which she underlines the differences in man's economic activities on various altitudes. As regards continental investigation, M a g i d o v i c h [44] claims that there are no reliable statistical calculations in this field. He summarises all that can be stated in the following sentence: "There is no doubt that the majority of the world's population live on a level lower than 200 metres". It must be admitted that this assumption is correct, since, according to the author's calculations, 56.2 per cent of the world's population inhabit areas less than 200 metres above sea-level.

IV. VERTICAL DISTRIBUTION OF POPULATION BY SIX LEVELS SELECTED

1. SURVEY OF DISTRIBUTION THROUGHOUT THE WORLD

Marked differences between various parts of the world are to be noted in the vertical, as in the horizontal distribution of population. The most general figures concerning whole continents are given in Tables 1 and 2.

Table 1

Area of hypsometrical levels, number of inhabitants (1945 figures), and density of world's population

| Continent | | Elevation above Sea Level | | | | | | total |
|--|----------------------------------|---------------------------|---------------|---------------|----------------|----------------|----------------|--------|
| | | up to 200 m | 200— 500 m | 500— 1000m | 1000— 1500m | 1500— 2000m | above 2000m | |
| Europe | Population figure in millions | 362.6 | 123.6 | 37.8 | 2.4 | . | . | 526.4 |
| | Area in mils. of sq. kms | 5.6 | 2.1 | 1.5 | 0.3 | 0.2 | 0.2 | 9.9 |
| | Density of pop. per sq. km | 64.8 | 59.0 | 25.0 | 8.0 | . | . | 53.2 |
| Asia | Population figure in millions | 712.8 | 297.3 | 148.2 | 60.4 | 29.8 | 11.7 | 1260.2 |
| | Area in mils. of sq. kms | 10.9 | 9.4 | 10.5 | 4.3 | 3.7 | 5.5 | 44.3 |
| | Density of pop. per sq. km | 65.3 | 31.6 | 14.3 | 14.3 | 7.4 | 2.1 | 28.4 |
| Africa | Population figure in millions | 57.1 | 42.4 | 36.6 | 24.3 | 12.2 | 3.6 | 176.2 |
| | Area in mils. of sq. kms | 2.9 | 11.6 | 8.4 | 3.6 | 2.4 | 0.9 | 29.8 |
| | Density of pop. per sq. km | 19.7 | 3.7 | 4.3 | 6.7 | 5.1 | 4.0 | 5.9 |
| North America (excl. of Green- land) | Population figure in millions | 93.8 | 66.7 | 15.8 | 8.3 | 8.0 | 7.6 | 200.2 |
| | Area in mils. of sq. kms | 7.1 | 7.2 | 2.7 | 3.4 | 1.2 | 0.34 | 21.94 |
| | Density of pop. per sq. km | 13.3 | 9.3 | 5.9 | 2.4 | 6.7 | 22.4 | 9.2 |
| South America | Population figure in millions | 41.8 | 14.8 | 25.5 | 4.6 | 4.2 | 10.9 | 101.8 |
| | Area in mils. of sq. kms | 6.8 | 5.3 | 3.4 | 0.6 | 0.4 | 1.3 | 17.8 |
| | Density of pop. per sq. km | 6.2 | 2.8 | 6.6 | 7.3 | 10.5 | 8.3 | 5.5 |
| Austra- lia | Population figure in millions | 7.8 | 1.9 | 0.9 | 0.1 | . | . | 10.7 |
| | Area in mils. of sq. kms | 3.5 | 3.6 | 1.5 | 0.12 | 0.1 | 0.08 | 8.9 |
| | Density of pop. per sq. km | 2.2 | 0.5 | 0.6 | 0.8 | . | . | 1.2 |
| Total | Population figure in millions | 1275.9 | 546.7 | 264.8 | 100.1 | 54.2 | 33.8 | 2275.5 |
| | Area in mils. of sq. kms | 36.8 | 39.2 | 28.0 | 12.32 | 8.0 | 8.32 | 132.64 |
| | Density of pop. per sq. km | 34.8 | 14.0 | 9.4 | 8.3 | 6.8 | 4.1 | 17.1 |

Table 2

World population in relation to area and to various hypsometrical levels (in percentages)

| Continent | | Elevation above the Sea Level | | | | | | Total |
|---------------------------------------|------------|-------------------------------|-------------|--------------|---------------|---------------|--------------|-------|
| | | up to 200 m | 200 — 500 m | 500 — 1000 m | 1000 — 1500 m | 1500 — 2000 m | above 2000 m | |
| Europe | Population | 68.8 | 23.5 | 7.2 | 0.5 | — | — | 100 |
| | Area | 56.6 | 21.2 | 15.2 | 3.0 | 2.0 | 2.0 | 100 |
| Asia | Population | 56.5 | 23.5 | 11.7 | 4.9 | 2.5 | 0.9 | 100 |
| | Area | 24.6 | 21.2 | 23.7 | 9.7 | 8.4 | 12.4 | 100 |
| Africa | Population | 32.4 | 24.1 | 20.8 | 13.8 | 6.9 | 2.0 | 100 |
| | Area | 9.8 | 39.1 | 28.1 | 12.0 | 8.0 | 3.0 | 100 |
| North America (excl. of Greenland) | Population | 46.9 | 33.3 | 7.9 | 4.1 | 4.0 | 3.8 | 100 |
| | Area | 32.4 | 32.5 | 11.4 | 15.6 | 5.5 | 1.6 | 100 |
| South America | Population | 42.3 | 15.0 | 22.8 | 4.7 | 4.2 | 11.0 | 100 |
| | Area | 38.2 | 29.8 | 19.1 | 3.4 | 2.0 | 7.3 | 100 |
| Australia | Population | 72.9 | 17.8 | 8.4 | 0.9 | — | — | 100 |
| | Area | 39.4 | 40.4 | 16.8 | 1.4 | 1.1 | 0.9 | 100 |
| All continents | Population | 56.2 | 24.0 | 11.6 | 4.4 | 2.3 | 1.5 | 100 |
| | Area | 27.8 | 29.5 | 21.2 | 9.7 | 5.6 | 6.2 | 100 |

The density of population diminishes as the land rises above sea level. This phenomenon is best illustrated by the graph below:

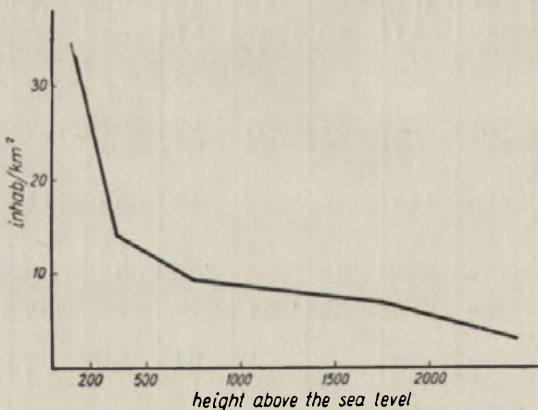


Fig. 1. Hypsographical curve of the world population

The biggest concentration of population on all continents occurs on the level from 0-200 metres. 56.2 per cent of the world's population, that is over half of the population, inhabit these areas, as was approximately estimated by Magidovich [44]. It is noteworthy that the area at this level amounts to only 27.8 per cent. The largest percentage figure is recorded in Europe, and this is quite comprehensible, considering the lowland character of this continent. The smallest percentage figure is recorded in Africa, but here, too, the 0-100 metre levels predominate. If we go on to consider the 0-100 metre level, the lowest level appears

considering the lowland character of this continent. The smallest percentage figure is recorded in Africa, but here, too, the 0-100 metre levels predominate. If we go on to consider the 0-100 metre level, the lowest level appears

to be outstandingly privileged in this respect. Let us take the examples of Europe and Africa. Despite the fact that these continents differ in their respective hypsometry and position in climatic zones, the predominance of the lowest level is evident.

Table 3

Distribution of population on certain continents on the
0—100 and 100—200 metre altitude ranges (1946)

| Continent | Elevation above sea-level m | Area in | | Population in | | Density of pop. per sq.km |
|------------------|-----------------------------------|--------------------|------|---------------|------|---------------------------------|
| | | thous. of sq.km | % | mills. | % | |
| Europe | 0—100 | 2,440 | 25.0 | 211.3 | 40.1 | 86.6 |
| | 100—200 | 3,180 | 32.0 | 157.0 | 29.8 | 49.4 |
| Africa | 0—100 | 1,130 | 3.8 | 44.1 | 25.0 | 39.0 |
| | 100—200 | 1,770 | 5.9 | 13.1 | 7.4 | 7.4 |
| South America | 0—100 | 3,230 | 18.1 | 31.4 | 30.8 | 9.5 |
| | 100—200 | 3,470 | 19.5 | 10.4 | 10.2 | 3.0 |

Characteristic are also the relations in South America where the 0-100 metre level covers, for the most part, sparsely peopled and vast lowlands on the Amazon and on the upper course of La Plata. In Africa and South America the maritime position and the communication conditions of the lowest level of habitation are the decisive factors.

Worth noting here are the lowest areas of the globe — the depressions. It is difficult to estimate the total number of their population, since, for example, in the case of the Dutch Depression the figures are not easily accessible. Similarly Baku lies only partially in a depression. In Poland the depression of the Vistula, Żuławy covers an area of 460 sq.km, with a population of approximately 27,000. In the Fajum depression in Egypt there are eleven settlements with about 8,000 inhabitants. In the United States 40,000 people live in the Salton Sea depression. One may assume a total of six million inhabitants in all the depressions of the globe, with about four million in Holland.

From the general point of view the characteristic features of the distribution of the population on levels above 1,000 metres are of importance. Table 4 is revealing in this respect. The greater part of the population (in percentages for the given continent) live on this level in Africa, next in South America, while in absolute figures Asia comes first with nearly 102,000,000 people living more than 1,000 metres above sea-level. Europe, exclusive of the Caucasus, is a continent where habitation on low levels predominates. The fact that in Africa such a considerable percentage of the

population live in higher altitudes can be put down to the climatic conditions, although, for example, in Nigeria and the Sudan (see Tables 77 and 78), the greatest density of population is recorded precisely on lower levels. Sapper, guided by racial premises, assumes that the higher regions of Africa are inhabited by 60% of the total population, putting this down to the effect of climatic conditions. It is the economic and not climatic conditions that determine the distribution of the population, also in Africa.

Table 4

World's population living above the 1,000 metre level

| Continent | Number of population | Percentage of inhabitants of a given continent |
|---------------|----------------------|--|
| Europe | 2,400,000 | 0.5 |
| Asia | 101,900,000 | 8.1 |
| Africa | 40,100,000 | 22.8 |
| North America | 23,900,000 | 11.9 |
| South America | 19,700,000 | 20.0 |
| Australia | 100,000 | 0.9 |

In all, 188,000,000 people inhabit areas above the 1,000 metre level. Of this figure, 9,300,000 — 5 per cent — are accounted for by big cities (of over 100,000 inhabitants). Urbanisation on these levels is proceeding also at a rapid pace.

Of the above number of 188,000,000, over 80,000,000 people, i. e. 43 per cent of the total figure inhabiting this altitude, live in the tropics. Bearing in mind that the total population in the tropics numbers 620,000,000 people (1945), the percentage of the population inhabiting the above-mentioned hypsometrical levels in the tropics is evidently higher than the percentage

Table 5

Population above the 1,000 metre level in the tropical zone

| | |
|---------------|------------|
| Asia | 12,020,000 |
| Africa | 30,980,000 |
| North America | 18,650,000 |
| South America | 18,610,000 |
| Oceania | 100,000 |
| Total | 80,360,000 |

of the population at the respective level of the whole globe — in the tropics 13 per cent of the people live above the 1,000 metre level, while the figure for the whole world is 8.2 per cent. Forty per cent of this figure are accounted for by Africa, a tropical continent with high uplands, this continent having half the tropic's area of the lands above 1,000 metres.

81,000,000 people live at an altitude of over 1,500 metres; however, in Europe and Australia this level is almost uninhabited. This figure is very large, and still more interesting is the considerable density of population on the 1,500-2,000 metre level. It amounts to an average of 7 people per sq.kilometre. This figure should be viewed as contrasting with the fact that over an inhabited area of 100,000,000 sq.kilometres the density amounts to less than one per sq.kilometre. The fall in density in relation to the ascending altitude is not the same in all continents.

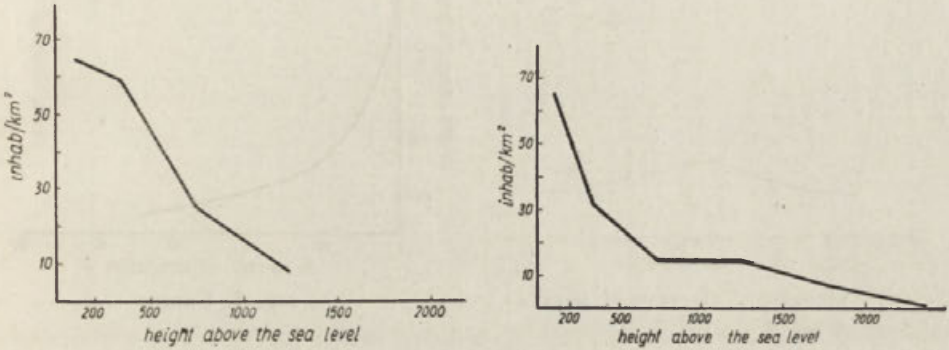


Fig. 2—3. Hypsographical curves of population: Europe, Asia

In Africa, for instance, the 1,000—2,000 metre level shows a second maximum, for there lie densely populated areas, such as Ruanda and the Transvaal. In South America, a kind of inversion of population density is to be

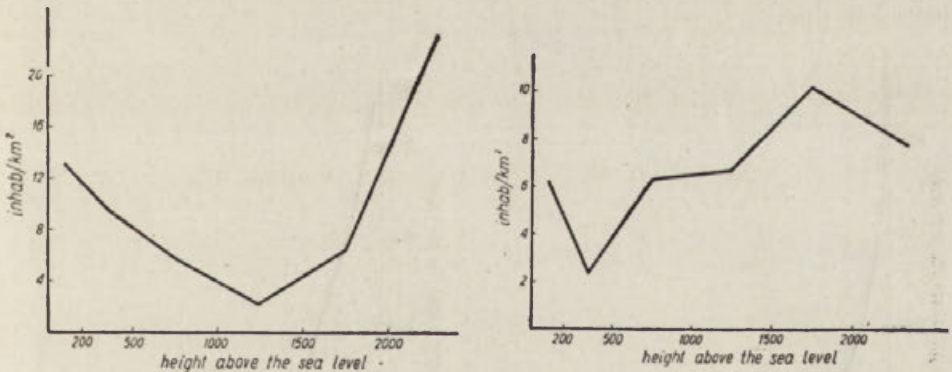


Fig. 4—5. Hypsographical curves of population: North America, South America

observed in its vertical distribution; for there the most densely populated area is above the 2,000 metre level.

In North America, densely populated Mexico is situated above the 2,000 metre level, the minimum density of the whole continent at the level

of 1,000-1,500 metres being accounted for by the sparsely peopled areas of the Great Basin.

In Asia, just as in Europe, certain critical levels can be observed, where the density of population suddenly begins to diminish. In Asia this occurs at the level of approximately 1,000 metres, while in Europe

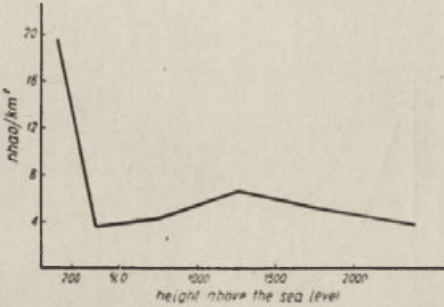


Fig. 6. Hypsographical curve of population — Africa

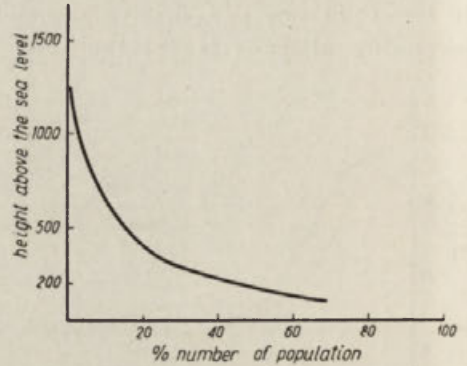


Fig. 7. Europe

the corresponding level is about 500 metres. The critical level, dependent on the prevailing social and economic relations, is also influenced by geographical environment.

By drawing a graph of the absolute figures of the vertical distribution of the population, we obtain a diagram analogous to that of the hypsometrical line.

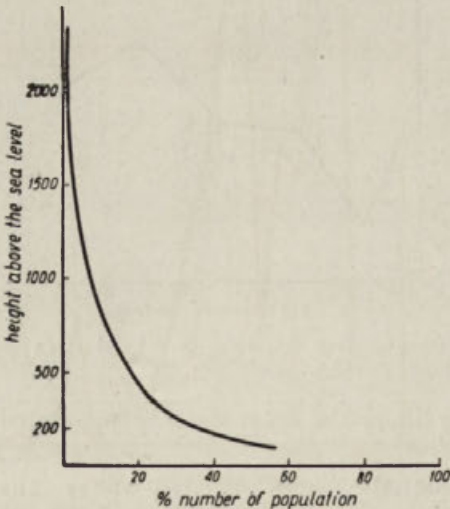


Fig. 8. Asia

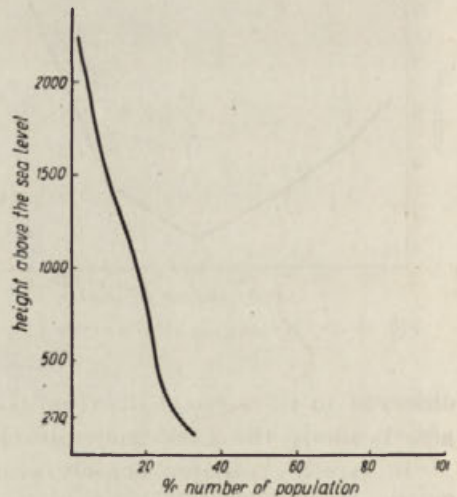


Fig. 9. Africa

This will be a graph of the vertical distribution of population on the continental scale. A comparison of Europe with Africa is instructive in this respect.

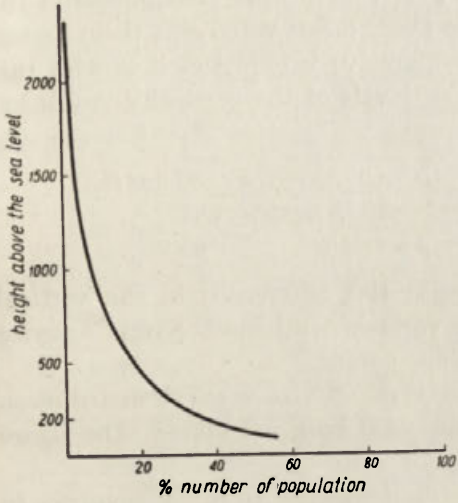


Fig. 10. North America

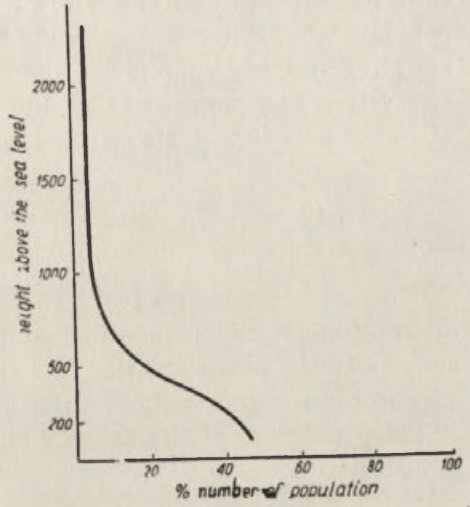


Fig. 11. South America

These diagrams fully reveal the geographical environment contrasts, especially in the social and economic system of these two continents. The

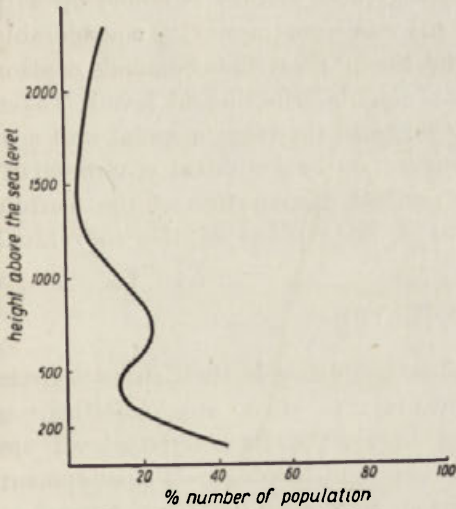


Fig. 12. World population

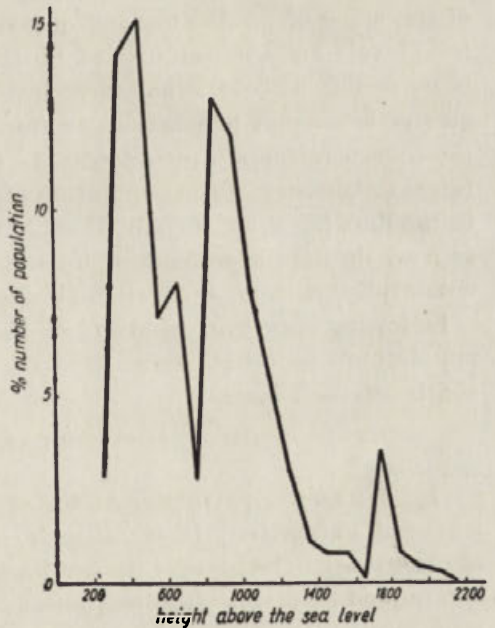


Fig. 13. The Altai Mountains

predominance of the 400—1,400 metre level in Africa, as compared with Europe, is clearly evident.

Using the method of constructing a hypsometrical curve, it is also possible to calculate the mean level of the vertical distribution of the population of a given continent. Like every mean value also these figures are of exclusively approximate and comparative value. And it is with this reservation that we give below the mean levels of the vertical distribution of the population of all continents:

| | | | |
|--------|------------|---------------|------------|
| Europe | 168 metres | North America | 430 metres |
| Asia | 319 „ | South America | 644 „ |
| Africa | 590 „ | Australia | 95 „ |

These figures expressively characterise the differences in the vertical distribution of the population on the various continents. South America and Australia constitute the two extreme points.

For comparative purposes the mean level of the vertical distribution of the population of the entire globe has also been calculated. The figure is 320 metres.

Certain characteristic levels can be distinguished in many countries in the hypsometrical distribution of the world's population, where the majority of the population of the given country is concentrated. These are not maximum levels in the climatic determinist sense or ecological determinist sense in general. Here we are rather dealing with the complex effect of the mode of production and of geographical environment. The characteristic levels are not conditioned by the same factors in all countries. There is no doubt, however, that these levels exist and are marked, as a rule, by greater density of population. In this case greater density is bound up with the concentration of larger towns. In many cases one large city considerably raises the density of the population of the given area. This demands caution in the drawing up of a comparison of two neighbouring height levels. Taken as a whole it is a problem of urbanisation, and therefore a social and economic phenomenon, only slightly dependent on geographical environment.

Following this brief analysis of the vertical distribution of the world's population, we shall now pass on to a description of the individual continents and states.

2. EUROPEAN COUNTRIES

In Europe particular groups of countries differ in their characteristic levels of habitation. It is difficult, however, to effect any classification of countries on the basis of the level criterion, for the characteristic levels are determined by diverse factors, first and foremost by the degree of development of productive forces. The population relations in Europe have been formed as

result of a long and complex historical process. To discuss this process in full would go beyond the scope of this work. Consequently only characteristics of the vertical distribution of population are given here.

In Poland, the characteristic levels are the 200—300 and 300—500 metre altitudes, where the density of population is more than double that of the other levels. More or less densely populated industrial regions are to be found on these levels. The three lower levels, situated in the Great Lowland regions and in the Baltic belt are much less populated.

Vertical distribution of population in Poland (1946)

Table 6

| Altitude m | Area in sq.km | Number of population | Density of population per 1 sq.km | % of total popul. | % of area |
|---------------|---------------|-------------------------|---|----------------------|-----------|
| Up to 50 | 22,113 | 1,364,000 | 61.7 | 5.7 | 7.1 |
| 50— 100 | 56,427 | 3,435,000 | 60.9 | 14.6 | 18.1 |
| 100— 200 | 155,222 | 9,248,000 | 59.6 | 39.2 | 49.8 |
| 200— 300 | 50,613 | 6,867,000 | 135.6 | 29.0 | 16.3 |
| 300— 500 | 17,629 | 2,306,000 | 130.8 | 9.7 | 5.6 |
| 500—1000 | 9,048 | 411,000 | 45.6 | 1.8 | 3.1 |
| Above 1000 | 678 | | | | |
| Total | 314,730 | 23,631,000 | 75.8 | 100 | 100 |

The overwhelming majority of towns in Poland are situated on levels below 300 metres. On levels above this altitude there are ca 6% of total urban population (table 7).

Towns of Poland situated over 300 metres above sea-level (1946)

Table 7

| Altitude m | Carpathian mountains | | Sudeten mountains | | Małopolska upland | | Total | |
|---------------|-------------------------|---------|----------------------|---------|----------------------|--------|-------------|---------|
| | num- ber | inhab. | num- ber | inhab. | num- ber | inhab. | num- ber | inhab. |
| 300—400 | 15 | 110,668 | 8 | 107,941 | 4 | 23,035 | 27 | 241,644 |
| 400—500 | 4 | 7,667 | 8 | 121,949 | — | — | 12 | 129,616 |
| 500—600 | 1 | 8,144 | 4 | 25,394 | — | — | 5 | 33,538 |
| 600—700 | — | — | — | — | — | — | — | — |
| 700—800 | 1 | 2,649 | — | — | — | — | 1 | 2,649 |
| 800—980 | 1 | 13,752 | — | — | — | — | 1 | 13,752 |
| Total | 22 | 142,880 | 20 | 255,284 | 4 | 23,035 | 46 | 421,109 |

Although urban settlements in the Carpathian mountains reach a higher level than those in the Sudeten mountains, the towns in the latter are far larger which is bound up with their high degree of industrialisation.

With social and economic development and with advancing industrialisation there occurs a diminution of the share of the agricultural population in the total population of a given country. The process of depopulation of mountain regions is only one of the signs of the diminution of the agricultural population. In England this process began in the first half of the nineteenth century, in other West European countries later, in Central Europe and Poland still later — in fact, not until the twentieth century.

In agricultural and poorly industrialised countries, there is either no depopulation of mountain regions, or when it does occur, it is very slight. Proof of this is provided by the Carpathian districts where the population development proceeded parallel with that of other regions of the country, both throughout the nineteenth century and in pre-war Poland. This was due to Poland's economic backwardness both during the partition period and in the interwar years. Table 8 presents figures indicating a rise in the density of population in the Nowy Targ and Żywiec districts. The boundaries of the Żywiec district have undergone almost no change since 1869; the boundaries of Nowy Targ did change and that is why in the case of the latter only density figures are given.

T a b l e 8

Population development in the districts of Nowy Targ and Żywiec in the years 1869—1931

| District | Year | Density of pop. per sq.km | District | Year | Population | Density of pop. per sq.km | |
|-----------|------|---------------------------|----------|------|------------|---------------------------|-----|
| Nowy Targ | 1869 | 50.9 | Żywiec | 1869 | 80,753 | 73 | |
| | | | | | 1890 | 97,810 | 88 |
| | 1900 | 60.5 | | | 1900 | 108,629 | 94 |
| | 1910 | 61.9 | | | 1910 | 119,653 | 104 |
| | 1921 | 60.4 | | | 1921 | 109,457 | 95 |
| | 1931 | 63.6 | | 1931 | 131,000 | 114 | |

Thus in these two typical Carpathian districts we can see a constant increase of population in the course of two generations, while the slight drop recorded in 1921 is the result of the first world war and, as is known, this phenomenon was apparent in the whole of Poland. No depopulation of the mountain region in Poland is thus observed. This will be discussed in detail in the section dealing with the alpine countries.

The predominance of habitation on the 100—200 metre altitude range in G e r m a n y is due to the fact that the extremely densely populated

Ruhr Basin is situated on this altitude. With its density of 115 inhabitants per square kilometre, the level of 500—1000 metres stands out among other areas of the same altitude in the remaining European countries.

Table 9

Vertical distribution of population in Germany (1950)

| Altitude m | Area in | | Population | | Density of pop. per sq. km |
|---------------|---------|------|------------|------|----------------------------------|
| | sq. km | % | number | % | |
| Depression | | | 40,000 | 0.1 | |
| 0—100 | 145,000 | 40.7 | 25,700,000 | 37.3 | 177.1 |
| 100—200 | 44,000 | 12.4 | 17,400,000 | 25.0 | 388.6 |
| 200—500 | 110,000 | 30.9 | 19,600,000 | 28.5 | 178.2 |
| 500—1000 | 54,000 | 15.2 | 6,120,000 | 9.0 | 115.2 |
| Above 1000 | 3,000 | 0.8 | 40,000 | 0.1 | 13.3 |
| Total | 356,000 | 100 | 68,700,000 | 100 | 193.0 |

The effect of industrialisation on the vertical distribution of population can be studied on the example of Saxony. In the southern part of the country, where the elevation rises to a height of 1000 metres, the higher levels are inhabited by people who have for long been engaged in domestic industry. We observe, therefore, relative increase of density of population in higher levels. The calculations carried out by the author for Saxony (Table 10) indicate that basic changes have taken place there in the course of the past 120 years.

Table 10

Changes in the vertical distribution of the population
of Saxony in the years 1815 and 1933

| Level m | 1933 % of population | 1815 % of population |
|------------|-------------------------|-------------------------|
| 0—200 | 48 | 28.5 |
| 200—500 | 40 | 53.3 |
| 500—1000 | 12 | 18.2 |
| Total | 100 | 100.0 |

Large numbers of inhabitants concentrated in the large cities lying on the lowest levels, and the percentage of the population living above 500 metres, fell from 18 per cent in 1815 to 12 per cent in 1933.

The population of six southern districts stretching over an area of 2,887 sq.km on altitudes from 400—900 metres, was as follows:

| | | | |
|------|----------------|----------------------|-----------------------------|
| 1861 | 370,000 inhab. | 128 inhab. per sq.km | 17.1% of the pop. of Saxony |
| 1900 | 604,000 " | 209 " " " | 14.4% " " " " |
| 1933 | 642,000 " | 222 " " " | 12.3% " " " " |

These were very densely populated districts, although upland and mountainous, including an important mining area at Freiberg. However, with the increase and concentration of industry in Germany, the increase of population was checked.

Almost the whole of Denmark is situated on the 0—100 metre level.

In Holland one is struck by the considerable percentage of the population (nearly 40 per cent) inhabiting a depression.

In Belgium, over 80 per cent of the population live in areas below 100 metres, where the density of population is almost 500 inhabitants per sq.km (the majority of Belgium's large towns are to be found here).

Table 11
Vertical distribution of population in Belgium (1945)

| Level m | Area in | | Population | | Density of pop. per sq. km |
|------------|---------|------|------------|------|----------------------------------|
| | sq. km | % | number | % | |
| Depression | 370 | 1.2 | 50,000 | 0.6 | 135.1 |
| 0—100 | 14,530 | 47.7 | 7,085,000 | 83.8 | 487.6 |
| 100—200 | 6,300 | 20.7 | 614,000 | 7.3 | 97.4 |
| 200—300 | 4,000 | 13.1 | 637,000 | 7.5 | 78.1 |
| 300—500 | 4,160 | 13.6 | | | |
| Above 500 | 1,140 | 3.7 | 66,000 | 0.8 | 57.9 |
| Total | 30,500 | 100 | 8,452,000 | 100 | 277.1 |

France is a country where the characteristic level is 0—100 metres. Half of the country's population live on 28 per cent of the country's area. This level covers mainly the coastal belt, the north-eastern industrial region, and Paris. With the rise in altitude, the population consistently diminishes.

Fifty-eight per cent of the population of the towns of more than 5,000 inhabitants (excluding Paris) live on a level of 0—100 metres, while 27 per cent live on the 100-200 metre level. Only towns in the Jura, in the Hautes Alpes department, and in the Central Massif are situated above the 800 metre level. Ponarlier in the Jura (837 metres) has a population of 12,000, and

Briançon in the Alps (1,200—1,300 metres) has also 12,000 inhabitants and is the highest lying town in France.

Table 12
Vertical distribution of population in France (1936)

| Level m | Area in | | Population | | Density of pop. per sq. km |
|------------|---------|------|------------|------|----------------------------------|
| | sq. km | % | number | % | |
| 0— 90 | 140,300 | 25.5 | 19,210,000 | 45.4 | 136.9 |
| 90— 180 | 127,500 | 23.1 | 9,120,000 | 21.5 | 71.5 |
| 180— 300 | 105,200 | 19.1 | 6,300,000 | 14.9 | 59.9 |
| 300— 460 | 59,800 | 10.8 | 3,530,000 | 8.3 | 59.0 |
| 460— 920 | 72,300 | 13.1 | 3,760,000 | 8.9 | 52.0 |
| 920—1830 | 33,500 | 6.1 | 410,000 | 1.0 | 12.2 |
| 1830—2750 | 9,200 | 1.7 | . | . | . |
| Above 2750 | 3,200 | 0.6 | . | . | . |
| Total | 551,000 | 100 | 42,330,000 | 100 | 76.8 |

Singular has been the development of the urban population in France since the French Revolution (1789). When the Revolution broke out, France's urban population numbered over 25 per cent of the total. In this respect France outstripped other European countries with the possible exception of certain Italian territories. The vertical distribution of the population of France at that time is illustrated in Table 14. The low-lying

Table 13
Towns in France with more than 5,000 inhabitants (1926)

| Level m | Number of towns | Number of inhabitants | % |
|------------|-----------------|-----------------------|------|
| 0—100 | 249 | 8,235,400 | 64.5 |
| 100—200 | 98 | 2,518,900 | 19.7 |
| 200—300 | 51 | 1,085,400 | 8.5 |
| 300—400 | 26 | 352,900 | 2.8 |
| 400—500 | 13 | 240,600 | 1.9 |
| 500—600 | 5 | 232,100 | 1.8 |
| Above 600 | 11 | 101,300 | 0.8 |
| Total | 453 | 12,766,600 | 100 |

towns had then a marked predominance over others, this being bound up with the poor utilisation of mineral resources located on higher levels, and also with the primitive traffic facilities then available. Excluding Paris, the 0—100 metre altitude range accounted for 62 per cent of the total urban population in 1792, but by 1926 it had dropped to 47 per cent. With the advance of industry, certain towns situated on higher levels in Lorraine and Burgundy, in particular in the Central Massif (358 metres above sea level), where the population of Clermont-Ferrand rose from 30,000 to 112,00, and that of St. Étienne (517 metres above sea level) from 25,000 to 194,000, rapidly developed in connection with the intensive exploitation of mineral raw materials. The development of these higher situated towns led to a situation where the urban population living on the 500—700 metre altitude range increased in that period in the proportion of 1 to 353, whereas on the 0—100 metre range, the increase in urban population was only slight.

Table 14

Changes in the vertical distribution of urban population in France
in the years 1792—1926

| Level m | 1926 | | | 1792 | | Index of rise in popul. (1792 = 100) |
|------------|-------|------------|------|-------------|------|--|
| | towns | population | | population* | | |
| | | number | % | number | % | |
| | Paris | 2,871,000 | 27.5 | 641,000 | 11.6 | 448 |
| 0—100 | 195 | 3,819,000 | 36.5 | 3,026,000 | 54.8 | 126 |
| 100—200 | 106 | 1,742,000 | 16.7 | 897,000 | 16.3 | 194 |
| 200—300 | 82 | 1,343,000 | 12.8 | 613,000 | 11.1 | 219 |
| 300—500 | 41 | 351,000 | 3.4 | 229,000 | 4.1 | 153 |
| 500—700 | 11 | 271,000 | 2.6 | 77,000 | 1.4 | 352 |
| Above 700 | 8 | 53,000 | 0.5 | 37,000 | 0.7 | 143 |
| Total | 444 | 10,450,000 | 100 | 5,520,000 | 100 | 189 |

On the other hand, for the past hundred years we have been observing a steady depopulation of the alpine departments. The population of some of them is half that of the 1851 figure.

* Figures relating to the year 1792 are quoted from the publication; "Tableau alphabétique de la population de 558 villes de France, tiré des archives de la République", par C. Camus, (1802).

Table 15

Population of the Alpes Basses department in the years 1801—1946

| Year | Population | Year | Population |
|------|------------|------|------------|
| 1801 | 134,000 | 1891 | 124,000 |
| 1821 | 149,000 | 1901 | 118,000 |
| 1841 | 156,000 | 1911 | 107,000 |
| 1851 | 152,000 | 1921 | 91,000 |
| 1861 | 146,000 | 1931 | 87,900 |
| 1872 | 139,000 | 1936 | 85,100 |
| 1881 | 126,000 | 1946 | 83,400 |

The Alpes Basses department is a typical example; here the depopulation is strongly evident, and is accompanied by the devastation of forests and by the expansion of river gravel grounds on to the inundation terraces. This process cannot be halted even by hydro-electrification, a fact which does not lead to the economic animation of these alpine valleys.

Great disproportions are apparent in the vertical distribution of population in Great Britain, where 81 per cent of the population live on levels up to 100 metres, stretching over less than half the area (47 per cent) of the island. Explanation of this can only partly be offered by hypsometry and other conditions of geographical environment. Altitudes above 305 metres (1,000 feet) are almost uninhabited in Great Britain. Habitation is only to be found along the river valleys where here and there settlements rise higher. On the peneplain upland of the southern part of the Pennine Chain is to be found the only town in England situated higher than 305 metres. This is the Buxton borough surrounded by five other settlements. Westmoreland, notched by erosion, has not a single settlement located higher than 1000 feet. Cumberland has but a few settlements above this level. The Cheviot Hills are uninhabited. In Scotland only certain lake valleys have settlements lying above the 244 metre contour-line (800 feet).

Table 16

Vertical distribution of population in Great Britain (1931)

| Level m | Area in | | Population | | Density of pop. per sq. km |
|------------|---------|------|------------|------|----------------------------------|
| | sq. km | % | number | % | |
| 0—100 | 108,000 | 47.1 | 36,500,000 | 81.1 | 337.9 |
| Above 100 | 121,000 | 52.9 | 8,520,000 | 18.9 | 70.4 |
| Total | 229,000 | 100 | 45,020,000 | 100 | 196.5 |

In I r e l a n d (the whole island) 84 per cent of the population live on levels of up to 100 metres.

Also in S p a i n the 0—100 metre level stands out. There, the density of population is four times higher than the general country average.

Table 17

Vertical distribution of population in Spain (1940)
(excluding the Canary Island)

| Level m | Area in | | Population | | Density of pop. per sq. km |
|------------|---------|------|------------|------|----------------------------------|
| | sq. km | % | number | % | |
| 0— 100 | 29,000 | 5.8 | 6,300,000 | 25.0 | 217.2 |
| 100— 200 | 29,000 | 5.8 | 2,400,000 | 9.5 | 82.8 |
| 200— 500 | 133,000 | 26.7 | 7,100,000 | 28.2 | 53.4 |
| 500—1000 | 211,000 | 42.4 | 8,600,000 | 34.1 | 40.7 |
| 1000—1500 | 60,000 | 12.1 | 760,000 | 3.0 | 12.7 |
| 1500—2000 | 27,000 | 5.4 | 40,000 | 0.2 | 1.5 |
| Above 2000 | 9,000 | 1.8 | . | . | . |
| Total | 498,000 | 100 | 25,200,000 | 100 | 50.6 |

A similar situation is in P o r t u g a l where the density of population on the lowest level is, true, only twice that of the average for the whole country; nevertheless approximately 50 per cent of all the inhabitants of this country live there.

Table 18

Vertical distribution of population in Portugal (1940)

| Level m | Area in | | Population | | Density of pop. per sq. km |
|------------|---------|------|------------|------|----------------------------------|
| | sq. km | % | number | % | |
| 0— 100 | 20,300 | 22.9 | 3,440,000 | 47.7 | 169.4 |
| 100— 200 | 19,200 | 21.7 | 1,341,000 | 18.6 | 69.8 |
| 200— 500 | 30,600 | 34.5 | 1,728,000 | 23.9 | 56.5 |
| 500—1000 | 17,350 | 19.6 | 678,000 | 9.4 | 39.1 |
| 1000—1500 | 950 | 1.1 | 27,000 | 0.4 | 28.4 |
| Above 1500 | 200 | 0.2 | . | . | . |
| Total | 88,600 | 100 | 7,214,000 | 100 | 81.4 |

In Italy most of the population live on the 0—100 metre level, the next greatest group referring to the 200—500 metre altitude.

The Italian school of geographers has analysed hypsometrical conditions in the distribution of the population over a considerable part of the

Table 19
Density of population (inhabitants per sq. km)
in the Roman Province

| Level m | 1901 | 1881 |
|------------|-------|-------|
| 0— 100 | 125.6 | 81.7 |
| 100— 200 | 30.9 | 23.4 |
| 200— 300 | 59.8 | 46.9 |
| 300— 500 | 149.4 | 126.7 |
| 500— 800 | 107.7 | 92.7 |
| 800—1000 | 45.4 | 44.5 |
| 1000—1200 | 16.3 | 15.0 |

Apennine Peninsula. Outstanding is the Roman Province where the effect of age-old economic neglect finds its expression in widespread malaria, rampant on low levels. Table 19 illustrates an extremely characteristic picture (Rome is excluded from the calculations). The greatest density of population is recorded on 300—500 metre levels, above all in the Alban Hills. The 300-800 altitude range is four times more densely populated than the malaria-ridden level of 100—200 metres. In the coastal belt the greater density of population is due to the density of port — mainly fishing — settlements. The principal factor here, thus, are economic conditions.

Table 20
Density of population in the Central Apennines (1911)

| Level m | Density of population per sq. km |
|------------|-------------------------------------|
| 100— 200 | 65.5 |
| 200— 400 | 120.7 |
| 400— 600 | 120.2 |
| 600— 800 | 57.0 |
| 800--1000 | 34.7 |
| Above 1000 | 3.2 |

The same state is presented in the Central Apennines where the characteristic level is that of 400-600 metres, for here the considerable density of 120 inhabitants per sq.km refers exclusively to inhabitants of rural settlements.

The Apennines account for most of the mountainous (over 500 metres) areas in Italy. It is there, too, that the largest percentage of the population living on this level is to be found. Nevertheless, among the mountain areas it is Sicily that is distinguished by its greatest density of population.

Table 21

Population of Italy on levels higher than 500 metres (1936)

| Mountains | Area in sq. km | Population | Density of pop. per sq. km |
|-----------|----------------|------------|----------------------------|
| Alps | 30,000 | 1,377,000 | 37.1 |
| Apennines | 47,000 | 3,167,000 | 67.4 |
| Sicily | 7,100 | 1,043,000 | 147.0 |
| Sardinia | 4,800 | 211,000 | 46.0 |

Table 22 lists the changes in the vertical distribution of population in Italy in the years 1881-1936. The highest increase in population occurred at that time on the lowest levels whereas above 700 metres a drop was recorded. A similar situation is to be observed in the French and Austrian Alps.

Table 22

Changes in the vertical distribution of population in Italy in the years 1881-1936*

| Level m | Population | | Index of rise in pop. (1881 figure = 100) |
|-----------|------------|------------|---|
| | in 1936 | in 1881 | |
| 0-100 | 17,547,000 | 10,542,000 | 166.5 |
| 100-300 | 11,902,000 | 7,714,000 | 154.3 |
| 300-500 | 6,372,000 | 5,065,000 | 123.8 |
| 500-700 | 3,312,000 | 2,885,000 | 114.7 |
| 700-900 | 1,480,000 | 1,569,000 | 94.3 |
| Above 900 | 635,000 | 685,000 | 92.7 |
| Total | 41,248,000 | 28,460,000 | 145.0 |

In Switzerland the lowest level inhabited is the 200-500 metre elevation range, and there over half the country's population are concentrated. Of interest is the position of towns now having a population of over 10,000, as well as the rise in the number of their population in the period from 1850 to 1941. Noteworthy is the comparatively large number of towns on the 400-500 metre altitude range, concentrating nearly half the investigated urban population. These towns are marked by the highest increase in index in the past century.

* Source: R. Zampa 1882 (97); Annuario Statistico Italiano 1940 (5).

Table 23

Vertical distribution of towns (of over 10,000 inhabitants) in Switzerland

| Level m | Number of towns | Number of inhabitants | | Population rise in relation to 1850 |
|------------|--------------------|-----------------------|---------|---|
| | | 1941 | 1850 | |
| Up to 300 | 3 | 190,000 | 36,100 | 530 |
| 300—400 | 6 | 186,200 | 54,100 | 340 |
| 400—500 | 11 | 679,200 | 121,000 | 560 |
| 500—600 | 5 | 188,700 | 47,000 | 400 |
| 600—995 | 6 | 157,900 | 62,600 | 250 |
| Total | 31 | 1,402,000 | 321,000 | 440 |

An analysis of the changes in the vertical distribution of Switzerland's population in the years 1888—1950 reveals a rise in the percentage of the population living on the 200—600 metre altitude range, where the main industrial regions of the country are concentrated. A steady drop in the population on levels above 800 metres was recorded in the years from 1910—1940, while in the last decade there has occurred an increase in the population on these altitudes.

Table 24

Changes in the vertical distribution of population in Switzerland in the years 1888—1950*
(in thousands)

| Year | 200— 300 m | 300— 400 m | 400— 500 m | 500— 600 m | 600— 700 m | 700— 800 m | 800— 900 m | 900— 1000 m | 1000— 1200 m | 1200— 1400 m | Above 1400 m |
|------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|----------------|-----------------|-----------------|-----------------|
| 1888 | 140.6 | 281.4 | 1,020.5 | 557.0 | 289.1 | 218.4 | 140.6 | 120.6 | 86.3 | 34.951 | 27.554 |
| 1900 | 192.2 | 332.1 | 1,210.4 | 616.6 | 308.2 | 223.1 | 142.7 | 131.8 | 87.5 | 36.620 | 34.293 |
| 1910 | 234.9 | 385.0 | 1,396.0 | 702.4 | 345.4 | 233.6 | 148.0 | 135.3 | 91.2 | 40.045 | 41.358 |
| 1920 | 242.2 | 410.0 | 1,465.6 | 740.7 | 341.3 | 239.0 | 143.5 | 133.4 | 88.0 | 41.046 | 39.569 |
| 1930 | 270.5 | 427.9 | 1,593.3 | 772.8 | 333.0 | 227.5 | 137.5 | 125.0 | 88.4 | 44.523 | 45.796 |
| 1941 | 290.8 | 438.2 | 1,704.1 | 841.5 | 334.0 | 226.1 | 136.8 | 117.8 | 89.6 | 45.538 | 41.159 |
| 1950 | 332.7 | 498.3 | 1,916.6 | 931.8 | 354.7 | 233.1 | 140.4 | 122.4 | 92.9 | 48.535 | 43.465 |
| | in ‰ | | | | | | | | | | |
| 1838 | 48 | 96 | 350 | 191 | 99 | 75 | 48 | 41 | 30 | 12 | 10 |
| 1900 | 58 | 100 | 365 | 186 | 93 | 67 | 43 | 40 | 27 | 11 | 10 |
| 1910 | 63 | 103 | 372 | 187 | 92 | 62 | 39 | 36 | 24 | 11 | 11 |
| 1920 | 62 | 105 | 378 | 191 | 88 | 61 | 37 | 34 | 23 | 11 | 10 |
| 1930 | 66 | 105 | 392 | 190 | 82 | 56 | 34 | 31 | 22 | 11 | 11 |
| 1941 | 68 | 103 | 399 | 197 | 78 | 53 | 32 | 28 | 21 | 11 | 10 |
| 1950 | 71 | 106 | 406 | 198 | 75 | 50 | 29 | 26 | 20 | 10 | 9 |

* Source: Annuaire statistique de la Suisse 1950, p. 11.

In Austria the characteristic range is 200—500 metres, where more than 50 per cent of the population live. As far as settlements with more than 2,000 inhabitants are concerned, their number rises especially on the 300—400 and the 400—500 metre levels.

Table 25

Vertical distribution of settlements with over 2000 inhabitants in Austria in 1880 and 1920

| Level m | Lower Austria | | Upper Austria | | Salzburg | | Tirol | | Vorarl- berg | | Total | |
|------------|------------------|------|------------------|------|----------|------|-------|------|-----------------|------|-------|------|
| | 1880 | 1920 | 1880 | 1920 | 1880 | 1920 | 1880 | 1920 | 1880 | 1920 | 1880 | 1920 |
| 100—200 | 27 | 27 | — | — | — | — | — | — | — | — | 27 | 27 |
| 200—300 | 31 | 42 | 6 | 5 | — | — | — | — | — | — | 37 | 47 |
| 300—400 | 5 | 13 | 4 | 4 | — | — | — | — | 2 | 2 | 11 | 19 |
| 400—500 | 2 | 3 | 4 | 7 | 2 | 6 | 1 | 1 | 4 | 8 | 13 | 25 |
| 500—600 | 4 | 7 | 1 | 1 | — | 1 | 4 | 5 | 2 | 1 | 11 | 15 |
| 600—700 | — | — | — | — | — | — | 4 | 5 | — | — | 4 | 5 |
| 700—800 | — | — | — | — | — | 1 | — | 2 | — | — | — | 3 |
| 800—900 | — | — | — | — | — | — | 1 | 2 | — | — | 1 | 2 |
| 900—1000 | — | — | — | — | — | — | 3 | — | — | — | 3 | — |
| 1000—1100 | — | — | — | — | — | — | 1 | — | — | — | 1 | — |

The period from 1880 to 1920 witnessed a considerable rise in the population on the lowest levels up to 300 metres. This, of course, is bound up with the increase of the population of the largest towns.

Table 26

Changes in the vertical distribution of population of Austria in the years 1869—1910—1920*

| Level m | Population | | | Increase in years 1869—1920 (1869 = 100) |
|------------|------------|-----------|-----------|---|
| | 1920 | 1910 | 1869 | |
| Up to 300 | 3,236,000 | 3,427,000 | 1,851,000 | 180 |
| 300—800 | 2,829,000 | 2,858,000 | 2,246,000 | 126 |
| 800—1300 | 334,000 | 345,000 | 331,000 | 101 |
| Above 1300 | 16,800 | 17,100 | 19,700 | 85 |
| Total | 6,415,800 | 6,647,100 | 4,447,000 | 144.2 |

After the second world war a radical change took place in Austria. Table 27, compiled on the basis of Engelmann and the 1952 Austrian Statistical Year-book, is instructive inasmuch as it affords the possibility of

* Source: R. Engelmann, 1924 [19].

analysing the distribution of the population movements resulting from post-war resettlement.

Table 27

Vertical distribution of population of Austria in the years 1920 and 1950

| Level m | Population | | | | Population rise (1920 — 100) |
|------------|------------|------|-----------|------|------------------------------------|
| | 1920 | | 1950 | | |
| | number | % | number | % | |
| Up to 500 | 4,910,000 | 75.8 | 5,009,195 | 72.3 | 102.1 |
| 500— 800 | 1,213,000 | 18.7 | 1,510,198 | 21.8 | 125.0 |
| 800—1000 | 232,000 | 3.6 | 267,220 | 3.9 | 115.1 |
| Above 1000 | 120,000 | 1.9 | 141,280 | 2.0 | 117.5 |

The biggest rise is to be noted in the 500—800 metre altitude range, where a considerable number of industrialised townships, relatively little touched by war devastation, are situated in the Austrian Alps. This level accounts for two-thirds of the rise in population. On the other hand, on the lower levels (among others in the big towns), the rise has not even reached the figure of 100,000 inhabitants, and the increase index is very low.

Table 28 lists Grossinger's results [27] for Bohemia, which is one of the higher situated countries in Europe. The figures of this table are characteristic for a high-lying country. At the end of the nineteenth century, over 20 per cent of the urban population and 69 towns were situated above 500 metres.

Table 28

Vertical distribution of settlements with over 2,000 inhabitants in Bohemia (1890)

| Level m | Number of settlements | Population | |
|------------|-----------------------|--------------|-------|
| | | in thousands | in % |
| 100—200 | 28 | 367 | 8.2 |
| 200—300 | 76 | 472 | 22.4 |
| 300—400 | 98 | 476 | 28.8 |
| 400—500 | 69 | 216 | 20.3 |
| 500—600 | 45 | 161 | 13.2 |
| 600—700 | 12 | 48 | 3.5 |
| 700—800 | 7 | 26 | 2.1 |
| 800—900 | 5 | 13 | 1.5 |
| Total | 340 | 1,779 | 100.0 |

Today the majority of Czechoslovakia's population live on the 200—500 metre elevation range. Here, too, occurs the greatest density of population; not far behind is the density of population on the 100—200 metre altitude range.

Table 29

Vertical distribution of population in Czechoslovakia

| Level m | Area in | | Population | | Density of pop. per sq. km |
|------------|---------|-------|------------|-------|----------------------------------|
| | sq. km | % | number | % | |
| 100— 200 | 17,400 | 13.6 | 2,610,000 | 18.7 | 150.0 |
| 200— 500 | 61,900 | 48.4 | 9,000,000 | 64.7 | 145.4 |
| 500—1000 | 43,800 | 34.3 | 2,300,000 | 16.5 | 52.5 |
| Above 1000 | 4,700 | 3.7 | 10,000 | 0.1 | 2.1 |
| Total | 127,800 | 100.0 | 13,920,000 | 100.0 | 108.9 |

In Hungary the 0—100 metre elevation range is comparatively sparsely populated and is outstripped by the 100—200 metre range both as regards the number of inhabitants and density of population. The latter level covers over 50 per cent of the country's area.

Table 30

Vertical distribution of population in Hungary (1930)

| Level m | Area in | | Population | | Density of pop. per sq. km |
|------------|---------|-------|------------|-------|----------------------------------|
| | sq. km | % | number | % | |
| 0— 100 | 26,800 | 28.8 | 2,340,000 | 26.9 | 87.3 |
| 100— 200 | 49,500 | 53.2 | 5,470,000 | 63.0 | 110.5 |
| 200— 500 | 16,200 | 17.4 | 870,000 | 10.0 | 53.7 |
| 500—1000 | 500 | 0.6 | 5,000 | 0.1 | 10.0 |
| Total | 93,000 | 100.0 | 8,685,000 | 100.0 | 93.4 |

In Rumania, too, the 100—200 metre level stands out. Bucharest lies on this altitude with a population of 1,000,000. The 0—100 metre range is less peopled than the 200—500 metre altitude despite the fact that the largest Danubian cities are situated there.

Table 31

Vertical distribution of population in Rumania (1948)

| Level m | Area in | | Population | | Density of pop. p.r. sq. km |
|------------|---------|-------|------------|-------|-----------------------------------|
| | sq. km | % | number | % | |
| 0— 100 | 53,800 | 22.7 | 4,550,000 | 27.7 | 84.6 |
| 100— 200 | 44,500 | 18.8 | 4,660,000 | 28.4 | 104.7 |
| 200— 500 | 71,500 | 30.2 | 5,650,000 | 34.4 | 79.0 |
| 500—1000 | 44,400 | 18.7 | 1,490,000 | 9.1 | 33.5 |
| 1000—1500 | 19,300 | 8.1 | 60,000 | 0.4 | 2.7 |
| 1500—2000 | 3,100 | 1.3 | | | |
| Above 2000 | 400 | 0.2 | | | |
| Total | 237,000 | 100.0 | 16,410,000 | 100.0 | 69.3 |

The percentage of the urban population diminishes on the higher levels. The 0—100 metre altitude range covers 50 per cent of the towns with more than 5,000 inhabitants, including the capital. There are approximately 20 towns of this category in the high Transylvanian basins with a total of 350,000 inhabitants. The town Brashov with about 80,000 inhabitants, situated on an altitude of 575 metres, is one of the highest-lying larger towns in Europe.

Table 32
Vertical distribution of towns with over 5,000 inhabitants in Rumania (1930)

| Level m | Number of towns | Number of inhabitants | Percentage of population on given level |
|-----------|-----------------|-----------------------|---|
| 0—100 | 31 | 1,437,000 | 39.3 |
| 100—200 | 28 | 638,000 | 15.0 |
| 200—300 | 23 | 315,000 | 14.0 |
| 300—400 | 16 | 319,000 | |
| 400—500 | 8 | 117,000 | |
| Above 500 | 8 | 128,000 | 9.0 |
| Total | 114 | 2,954,000 | |

Changes which took place in the vertical distribution of Rumania's urban population in the years 1930—1948 are shown in Table 33. The largest increase in population took place, of course, in Bucharest. In the other towns, the greatest increase is to be observed on the lowest levels.

Ishirkov [32] carried out a hypsometrical survey of the distribution of population in Bulgaria. Here the larger towns determine the density of population on the individual levels. This is evident on levels above 500 metres, where the capital, Sofia, is situated.

Table 33
Changes in the vertical distribution of population in towns of over 10,000 inhabitants in Rumania in the years 1930 and 1948

| Level m | Number of towns | 1948 | | 1930 | |
|-----------|-----------------|------------|-------|------------|-------|
| | | population | % | population | % |
| Bucharest | 1 | 1,042,000 | 33.5 | 639,000 | 25.6 |
| 0—100 | 22 | 812,000 | 26.1 | 746,000 | 29.8 |
| 100—200 | 14 | 490,000 | 15.8 | 451,000 | 18.0 |
| 200—300 | 13 | 219,000 | 7.0 | 214,000 | 8.6 |
| 300—400 | 10 | 318,000 | 10.2 | 276,000 | 11.0 |
| 400—500 | 3 | 92,000 | 3.0 | 81,000 | 3.3 |
| Above 500 | 5 | 135,000 | 4.4 | 93,000 | 3.7 |
| Total | 68 | 3,108,000 | 100.0 | 2,500,000 | 100.0 |

Table 34

Vertical distribution of population in Bulgaria (1946)

| Level m | Area in | | Population | | Density of population per sq.km |
|------------|---------|-------|------------|-------|---------------------------------------|
| | sq.km | % | number | % | |
| 0— 100 | 9,800 | 8.8 | 1,100,000 | 15.9 | 112.2 |
| 100— 200 | 14,300 | 12.9 | 1,680,000 | 24.4 | 117.5 |
| 200— 500 | 50,300 | 45.3 | 2,400,000 | 34.8 | 47.7 |
| 500—1000 | 23,700 | 21.4 | 1 620,000 | 23.5 | 68.3 |
| Above 1000 | 12,900 | 11.6 | 100,000 | 1.4 | 7.8 |
| Total | 111,000 | 100.0 | 6,900,000 | 100.0 | 62.2 |

Table 35

Vertical distribution of towns in Bulgaria (1946)*

| Level m | Number of towns | Population number | Percentage of popul. on this level |
|------------|--------------------|----------------------|---|
| 0— 200 | 50 | 725,200 | 26.1 |
| 200— 500 | 31 | 366,000 | 15.2 |
| 500— 700 | 15 | 541,400 | 36.1 } incl. of Sofia — 439,900 inhabitants |
| 700—1000 | 9 | 44,200 | |
| Above 1000 | 1 | 3,400 | |
| Total | 106 | 1,680,200 | 24.3 |

In Yugoslavia the largest percentage of the population inhabit the 200—500 metre range, although the greatest density of population is to be found on the lowest level of 0-100 metres.

Table 36

Vertical distribution of population in Yugoslavia (1931)

| Level m | Area in | | Population | | Density of pop. per sq.km |
|------------|---------|-------|------------|-------|---------------------------------|
| | sq.km | % | number | % | |
| 0—100 | 23,800 | 9.3 | 3,078,000 | 21.2 | 129.3 |
| 100—200 | 35,500 | 13.8 | 3,864,000 | 26.6 | 108.8 |
| 200—500 | 71,400 | 27.8 | 4,619,000 | 31.8 | 64.7 |
| 500—1000 | 79,100 | 30.8 | 2,710,000 | 18.7 | 34.3 |
| 1000—1500 | 37,000 | 14.4 | 246,000 | 1.7 | 5.1 |
| Above 1500 | 10,200 | 3.9 | | | |
| Total | 257,000 | 100.0 | 14,517,000 | 100.0 | 56.5 |

* Source: E. B. Valev — Bulgaria; Ekonomiko-Geograficheskoye Opisanye, Moscow 1949 (91).

In Yugoslavia there are 24 towns with an approximate population of 300,000 living on levels above 500 metres. The towns in certain basins of Macedonia are situated high up: Ohrid is situated at a level of 700 metres; Prishtina — 630 metres; Bitolj — 613 metres.

Table 37

Vertical distribution of urban population in Yugoslavia (1931)

| Level m | Number of towns | Number of inhabitants | % of population on the resp. level |
|-------------------|--------------------|--------------------------|---------------------------------------|
| 0— 100 | 39 | 729,000 | 23.7 |
| 100— 200 | 32 | 889,000 | 23.0 |
| 200— 300 | 17 | 289,000 } | 9.3 |
| 300— 500 | 13 | 141,000 } | |
| 500— 700 | 16 | 250,000 } | 10.8 |
| 700—1000 | 7 | 44,000 } | |
| Above 1000 | 1 | 9,000 | 3.6 |
| Unindicated level | 3 | 37,000 | . |
| Total | 130 | 2,383,000 | 16.4 |

In Albania next to the greatest density of population on the 0—200 metre elevation range, is that on the 500—1000 metre level.

Table 38

Vertical distribution of population in Albania (1930)

| Level m | Area in | | Population | | Density of pop. per sq. km |
|------------|---------|-------|------------|-------|----------------------------------|
| | sq. km | % | number | % | |
| 0— 100 | 4,470 | 16.2 | 292,000 | 29.1 | 65.3 |
| 100— 200 | 3,060 | 11.1 | 146,000 | 14.5 | 47.7 |
| 200— 500 | 5,420 | 19.7 | 221,000 | 22.0 | 40.7 |
| 500—1000 | 6,600 | 23.9 | 279,000 | 27.8 | 42.3 |
| 1000—1500 | 7,990 | 29.1 | 61,000 | 6.1 } | 8.3 |
| Above 1500 | . | . | 5,000 | 0.5 } | |
| Total | 27,540 | 100.0 | 1,004,000 | 100.0 | 36.4 |

In Greece the density of population steadily diminishes as the altitude rises. Worthy of note is the fact that a considerable number of the population inhabit levels above 1,000 metres.

Table 39

Vertical distribution of population of Greece (1947)

| Level m | Area in | | Population | | Density of pop. per sq. km |
|--------------|---------|-------|------------|-------|----------------------------------|
| | sq. km | % | number | % | |
| 0— 100 | 33,000 | 24.9 | 3,650,000 | 50.3 | 110.6 |
| 100— 200 | 12,000 | 9.1 | 1,020,000 | 14.1 | 85.0 |
| 200— 500 | 35,000 | 26.4 | 1,270,000 | 17.5 | 36.3 |
| 500—1000 | 37,000 | 27.9 | 1,190,000 | 16.4 | 32.2 |
| 1000—1500) | 15,500 | 11.7 | 120,000 | 1.7 | 7.7 |
| Above 1500] | | | | | |
| Total | 132,500 | 100.0 | 7,250,000 | 100.0 | 54.7 |

In Finland habitation goes up only to 300 metres.

Table 40

Vertical distribution of population of Finland (1945)

| Level m | Area in | | Population | | Density of pop. per sq. km |
|------------|---------|-------|------------|-------|----------------------------------|
| | sq. km | % | number | % | |
| 0— 100 | 126,300 | 37.6 | 3,250,000 | 83.6 | 25.7 |
| 100— 200 | 134,600 | 40.0 | 587,000 | 15.1 | 4.4 |
| 200— 300 | 54,600 | 16.2 | 50,000 | 1.3 | 0.9 |
| 300— 500 | 17,500 | 5.2 | — | — | — |
| 500—1000 | 3,000 | 0.9 | — | — | — |
| Above 1000 | 300 | 0.1 | — | — | — |
| Total | 336,300 | 100.0 | 3,887,000 | 100.0 | 11.6 |

In the distribution of towns one is struck by the predominance of the 0—10 metre level. Mainly port towns are to be found on this level, and approximately 75 per cent of the urban population live there.

Table 41

Vertical distribution of towns in Finland (1942)

| Level m | Number of towns | Population | % of total population on the resp. level |
|------------|--------------------|------------|---|
| 0— 10 | 23 | 729,600 | 28,9 |
| 10— 50 | — | — | |
| 50—100 | 10 | 210,200 | |
| 100—200 | 2 | 56,000 | |
| Total | 35 | 995,800 | 25,6 |

An entirely different picture is presented by mountainous Norway. Here, despite the polar geographical latitude, approximately 20 per cent of the population inhabit levels higher than 200 metres, and of this percentage 160,000 people live in altitudes above 500 metres. Among the 50 urban settlements there are 41 port towns in Norway, where 90 per cent of the country's urban population are concentrated. There are only 5 towns in altitudes higher than 100 metres, with a total population of 32,500.

Table 42

Vertical distribution of towns in Norway (1946)

| Level m | Number of towns | Population | % of total population on the resp. level |
|-------------|--------------------|------------|---|
| Up to—100: | | | |
| Port towns | 41 | 792,000 | 47.5 |
| Other towns | 4 | 40,000 | |
| 100—200 | 5 | 32,500 | 4 |
| Total | 50 | 865,300 | 27.7 |

In Sweden approximately 75 per cent of the population live on altitudes of up to 100 metres; here, too, is the greatest density of population — nearly treble the average for the entire country.

Table 43

Vertical distribution of population of Sweden (1945)

| Level m | Area in | | Population | | Density of population per sq. km |
|------------|---------|-------|------------|-------|--|
| | sq. km | % | number | % | |
| 0—100 | 116,000 | 25.9 | 4,974,000 | 74.3 | 42.9 |
| 100—200 | 74,000 | 16.5 | 1,087,000 | 16.2 | 14.7 |
| 200—500 | 180,000 | 40.1 | 583,000 | 8.7 | 3.2 |
| 500—1000 | 74,300 | 16.6 | 54,000 | 0.8 | 0.7 |
| Above 1000 | 4,200 | 0.9 | | | |
| Total | 448,500 | 100.0 | 6,698,000 | 100.0 | 14.9 |

Altogether in north-western Europe (including Germany and Scandinavia) the altitude range of 0—100 metres covers an area of 390,000 sq.km. with a population of 87,000,000 inhabitants — a high density of population amounting to 225 persons per square kilometre.

The three great southern European peninsulas are extremely complex in their hypsometrical structure. A detailed analysis of the relations in the Mediterranean countries of Europe is to be found in the following table:

Table 44
Population of southern Europe, living above 500 metres (1945)

| Region | Area in sq. km | Population | Density of pop. per sq. km |
|---------------------------|----------------|------------|----------------------------|
| Balkan Peninsula* | 223,300 | 6,452,000 | 28.9 |
| Apennine Peninsula | 94,900 | 5,860,000 | 61.7 |
| Iberian Peninsula | 328,600 | 10,830,000 | 32.9 |
| Total | 646,800 | 23,142,000 | 35.8 |
| % of this level in Europe | 32.3 | 57.5 | |

Altogether, a total of 23,000,000 people live above the 500 metre level in southern Europe (excluding France) — more than half the total population of Europe on this level.

The vertical distribution of population in the mountains is of particular interest to various investigators, and therefore more attention has been paid to this problem as referring to the mountains of Europe.

The density of population on a particular mountain height is sometimes calculated with the exclusion of uninhabited areas. This was done with regard to the French Alps by J. Robert [71], and to the Austrian Alps by N. Krebs [37]. The Krebs method for small areas of the Carpathians was used in the interwar period by Sawicki's Cracow school [74].

But the conception of an "uninhabited area" in geography is of a relative value; one simply excludes freely chosen elements of the geographical environment of the mountain areas and constructs "uninhabited" areas on a topographical map. This, for example, is how Krebs proceeded in his map of point distribution of population in the Eastern Alps (see vol. 1, p. 296, scale map 1:1,500,000). So-called "Uninhabited" areas in the Alps, Carpathians or in other European mountain systems are in fact by no means uninhabited. Here we are dealing with poorly husbanded land which at most could be classified as limits of inhabited land. With the development of communication techniques and planned economy, such areas change their economic function and their character

The lack of precise differentiation between the manners of land utilisation in the mountains is the cause that the density of population figures

* Including Bulgaria and Albania.

after excluding the "uninhabited parts" for various mountain areas are not comparable with each other. Hanslik's [28] figures for the Western Beskids and Kubijowicz's figures for the Eastern Beskids must be interpreted differently from the figures for the density of population in the alpine valleys. Comparison can only be obtained by taking into account the whole area of the given mountain region. The density of population calculated in this manner affords an index of the degree of mountain habitation.

The degree of mountain habitation is, like the distribution of population in general, a function of social and economic relations. We shall select the most characteristic of a large number of examples to prove this thesis. In the Erzgebirge on the Bohemian and Saxonian side [11], industry and mining are highly developed; Schwarzwald is an area of forestry and animal-breeding. Table 45 gives the density of population on the various levels.

Table 45

Density of population in the Erzgebirge (1880) and Schwarzwald (1890)

| Mountains | Level | | | | | |
|------------------|---------|---------|---------|---------|----------|---------------|
| | 500—600 | 600—700 | 700—800 | 800—900 | 900—1000 | Above 1000 |
| Erzgebirge | 169 | 168 | 117 | 104 | 68 | 69 |
| Schwarz- wald | 32 | 39 | 31 | 51 | 23 | 18 |

It must be borne in mind that the figures relate to the Germany of the close of the nineteenth century, of the period marked by the formation of German imperialism. The mountain area in Table 45 amounts in the Erzgebirge to 2,800 sq.km and in Schwarzwald to 3,250 sq.km. These figures are most characteristic. On the 500—900 metre range the density of population exceeds 100 in the Erzgebirge, in Schwarzwald it does not reach 60. In the latter area the characteristic level of 800—900 metres is also astonishing. It is the result of Schwarzwald's morphology: on the lower-lying steep slopes, dissected by valleys, the settlements are smaller than on the pe-neplained plateau.

On the map of the distribution of the population of Europe, the great mountain ranges are notable for their considerably smaller density of population than the adjoining plains and lowlands. Table 46 is an attempt at calculating the number of inhabitants of the larger mountain system in Europe. In order to define and compare the figures, areas rising above the 500 metre contour line exclusively have been taken into account. This line, generally speaking, well delineates the larger mountain systems of Europe.

Table 46

Population of the mountains of Europe above 500 metres

| Mountains | Area in sq. km | Population | Density of pop. per sq. km | Population above 1000 m |
|-------------|----------------|------------|----------------------------|-------------------------|
| Carpathians | 102,900 | 2,880,000 | 28.0 | 120,000 |
| Alps | 157,000 | 5,180,000 | 33.0 | 620,000 |
| Pyrenees | 36,500 | 790,000 | 21.7 | 110,000 |
| Apennines | 47,000 | 3,167,000 | 67.4 | 98,000 |

In the Carpathians, Alps and Pyrenees, despite considerable morphological and climatic differences, the density of population of the whole mountain system is about 30. Extreme figures have been obtained for the Pyrenees and Apennines. The mountains of Europe above the 1000 metre level are very poorly inhabited.

Let us pass on to a detailed analysis.

In the Carpathians one can observe an even distribution of population over a considerable area. The most densely populated part is the sector lying in the Soviet Union. There, large and populous settlements reach high up into the mountains both in the North and the South, making intensive economic use of the mountain environment. In the valley of the Bistritsa Nadvornanskaya, according to Kubijowicz's calculations, using Krebs's method, the density of population on the 500—600 metre level amounted to 146, and on the 1,000—1,100 metre level — it was still as much as 89. Taking into account the entire mountain region on the 500—1,000 metre range, we obtain in the Ukrainian Carpathians a density of population amounting to 50.8. For the southern slopes in the valley of the river Borzhava, Kubijowicz calculated, using the Krebs method, that the density of population on the 400—500 metre range in the inhabited mountain areas was 870, while on the 500—600 metre range — 340 per sq.km.

In the Polish and Slovak Carpathians, as was proved by Sawicki [74], a clear graduation is evident. The most densely populated is the bottom of the valley — the most poorly, the plateau.

The situation in the Tatras has undergone a radical change under the influence of the tourist movement. Before its rise (approx. 1850), there were 31 settlements there with a population of 37,358 inhabitants. Of this figure, 10,335 lived above the 700 metre level. On the Polish side the highest lying houses were 1,077 metres above sea level, on the Slovak side — the huts of Kežmarok reached up to 1,377 metres above sea level. At that time, Zakopane had 2,185 inhabitants, but this, then considerable number,

Table 47

Population of the Carpathians above 500 metres (about 1940)

| Country | 500—1000 m | | | Above 1000 m | | | Total | | |
|---------------|----------------|----------------|----------------------------|----------------|----------------|----------------------------|----------------|----------------|----------------------------|
| | area in sq. km | pop. in thous. | density of pop. per sq. km | area in sq. km | pop. in thous. | density of pop. per sq. km | area in sq. km | pop. in thous. | density of pop. per sq. km |
| Poland (1946) | 6,960 | 231 | 33.2 | 576 | 2 | 3.5 | 7,536 | 233 | 32.0 |
| USSR | 11,700 | 590 | 50.8 | 5,400 | 50 | 9.2 | 17,100 | 640 | 37.4 |
| CSR | 15,860 | 630 | 40.0 | 3,457 | 10 | 2.9 | 19,317 | 640 | 34.0 |
| Rumania | 38,300* | 1,300 | 34.0 | 20,100 | 60 | 3.0 | 58,400* | 1,360 | 23.1 |
| Hungary | 500 | 5 | 10.0 | — | — | — | 500 | 5 | 10.0 |
| Total | 73,320 | 2,756 | 37.6 | 29,533 | 122 | 4.2 | 102,853 | 2,878 | 28.0 |

was due to primitive iron metallurgy. On the Slovak side Levoca had a population of 5,729 and was the largest Tatra settlement. In 1930, Zakopane had 16,300, and Levoca only 8,900 inhabitants.

Table 48

Settlements in the Tatras about the year 1850

| Level m | Number of settlements | Number of inhabitants |
|------------|-----------------------|-----------------------|
| Up to 600 | 5 | 27,023 |
| 600— 700 | 23 | |
| 700— 800 | 11 | |
| 800— 900 | 8 | 10,335 |
| 900—1000 | 6 | |
| Above 1000 | 8 | |
| Total | 61 | 37,358 |

The most sparsely populated are the Eastern Carpathians above 800 metres in Rumania. Despite this, six Carpathian boroughs are situated there above 1,000 metres, of which two are above 1,300 metres and one — Palatinis in the Transylvanian Alps — at a level of 1,403 metres. In all, there are 25 towns in Rumania situated above the Zakopane level.

The Alps represent conditions typical for the European mountains.

The Alps are well designed by the 500 metre contour-line accepted as

* Excluding Bihar.

the Alps boundary by Krebs [37]. Only in Bavaria does the high upland merge at this altitude with the Alps.

A survey of the population in the Alps above 500 metres is given in Table 49. In Switzerland, the considerable density of population is due to the population in the pre-Alps. The most sparsely inhabited are the French Alps which, in addition, are undergoing a process of marked and steady depopulation.

There is extensive literature — French and Italian, Swiss and Austrian— dealing with the decrease of the population in the Alps. The conclusions of all these researches are the same — the greater the economic passiveness of the area, the greater the decrease in population. In the mining regions, on the other hand, or on levels where large and important mountain health resorts are situated, there is an increase in population or even a rise in the percentage of the population inhabiting this level in relation to the total population in the country.

The manner in which this economic and social process has been taking place in the mountains is illustrated by the following comparison of numbers of inhabitants taken from a small alpine region. In eight communities situated along the route running through the Brenner pass [96], there lived:

| | |
|---------|---------------|
| in 1778 | 5,193 persons |
| in 1847 | 4,788 persons |
| in 1900 | 4,666 persons |

Before the railway was built across this pass, these communities were mail stages which was a source of considerable revenue for the population. But by the middle of the nineteenth century, together with the construction of the alpine railways, this decrease of population began and is still continuing today.

At present, approximately 62,000 people live above the 1,000 metre level in the Alps.

T a b l e 49

Population in the Alps above 500 metres

| Country | Area in sq.km | Population | Density of pop. per sq.km | Population above 1,000 m |
|---------------|---------------|------------|---------------------------|--------------------------|
| France (1936) | 32,700 | 550,000 | 16.8 | 85,000 |
| Switzerland | 27,900 | 1,820,000 | 65.2 | 172,000 |
| Italy (1936) | 36,000 | 1,400,000 | 38.9 | 239,000 |
| Austria | 51,000 | 1,140,000 | 22.0 | 120,000 |
| Germany | 6,200 | 190,000 | 32.0 | 5,000 |
| Yugoslavia | 4,000 | 80,000 | 20.0 | — |
| Total | 157,800 | 5,180,000 | 32.8 | 621,000 |

In 1910, in Switzerland [83] there were 29,780 people living at heights above 1,500 metres, of which number 24,344 people in 35 communities in the canton of Grisons. In 1950, 43,465 persons lived above the 1,400 metre level. Davos is situated at the upper limit of permanent settlements in Switzerland; today this climatic station has a population of some 10,000; once it was but a small mining settlement. The highest settlement in the Alps lies at an altitude of 1,949 metres (according to the population census). Generally speaking, the upper limit of permanent settlements in the Alps can be taken as 2,000 metres. Much depends here on the structure of the settlement, which is conditioned by economic relations. In the Eastern Alps [67], the Italian settlements are larger and compact, rarely lying higher than the 1,400 metre level, while the German settlements are less concentrated and individual farmsteads go up far higher.

In the alpine valleys the density of population is, on the whole, much smaller than in Beskids in Poland or Ukraine. In the valley of the upper reaches of the Po river [22] there are 90—100 inhabitants per sq.km; in Valle Malone — 157. In other valleys the density of population varies between 50 and 80. In all, 500,000 people inhabit the bottom of the Italian Alps valleys, excluding the Adige valley (1911), and the density of population amounts to 57. The vast elongated valleys of the Austrian Alps are more sparsely populated — here the density of population is between 40 and 70. The Aosta valley, stretching deep into the Alps, has a total of 92,000 inhabitants living on an area of 3,203 sq.km (1948) — the density of population amounting to 28.

Local conditions — that is micro-climate and micro-morphology — their bearing on habitation, have been the subject of much research. There is a considerable wealth of literature in this field.

The compact chain of the Pyrenees covers a comparatively small area within the 500 metre contour-line — 36,500 sq.km, of which 11,500 sq.km lie on the French side. The hypsometry of the French side, including the pre-Pyrenees, was surveyed by Teillefer [87.]. The average altitude is 987 m, the average height of the internal zone amounts to 1,524 metres.

The density of population in the Pyrenees is on the whole smaller than in the Alps, but the difference is negligible. The Pyrenean communities of the Ariège department [24] situated in the internal zone have a density of population of 5—10. In all, seven persons per sq.km live on the 1,000—2,000 metre altitude range in the Pyrenees. Almost the whole of Andorra lies higher than 1,000 metres, where the density of population amounts to 11 per sq.km. This figure is exact and may serve for the purpose of comparison. Of Andorra's 69 settlements [68], only 4 are situated a little below the 1,000 metre level, and two above the 2,000 m level. This is at the same time the upper limit of habitation in the Pyrenees.

The mountains of the Apennine Peninsula are, on the whole, not very compact. Only in Abruzzi do they form a larger compact mass. Here too are concentrated 75 per cent of the population of the Apennines, living above 1,000 metres. Forty communities live on the 1,000—1,300 metre range, and eight above 1,300 metres. The density of population in Abruzzi nowhere amounts to more than 50 per sq.km on levels above 800 metres.

In Albania [43] — in the North Albanian Alps (2,653 metres) shepherds huts reach a height of 1,800 metres, but permanent settlements are not to be found on levels over 1,000 metres. In southern Albania (2,480 metres), on one of the plateaux there are 30 settlements lying between the 1,000 and 1,400 metre levels. On the slopes of the lime massifs larger settlements are situated as high as the 1,300 metre contour-line.

All the isolated mountains on the Mediterranean Sea, such as Pindus, Olympus, Etna, Sierra Nevada, Lebanon and Taurus, have a comparatively damp climate in summer and therefore the population is concentrated on their slopes. Despite this and despite the warmer climate, settlements do not go up higher there than in the Alps. In the Catalonian Mountains, for instance, barely 34 houses have been noted above 1,600 metres*. According to Quelle's calculations [64], plant cultures are to be found on the isolated mountain massifs on the Mediterranean Sea up to the following heights:

Table 50

Upper limit of plant cultures in the mountains of Europe

| Culture | Mountains | | |
|------------------|--------------------|-----------|------------------|
| | Sierra Nevada m | Etna m | Peloponnese m |
| Wheat, rye | 2,500 | 1,625 | 1,500 |
| Maize | 1,650 | 1,380 | 1,300 |
| Grapes | 1,450 | 1,375 | 1,250 |
| Olive trees | 1,350 | 920 | 680 |
| Citrus fruits | 700 | 560 | 300 |
| Edible chestnuts | 1,700 | 1,630 | 1,400 |

The highest plant zones are to be found in Sierra Nevada. Here, over an area of 2,750 sq.km (excluding Granada), approximately 40,000 people lived in 1900 [64]. The density of population amounted to 50 per sq.km, and thus was quite considerable for the economic relations prevailing in Spain. The highest settlement of T r e v é l e z [66] lies at a height of 1,625 metres. On the northern slope, the upper limit of habitation does

* Congrès International de Géographie, Comptes Rendus, Vol. II, Amsterdam 1938, p. 5.

not exceed 1,400 metres because of the lack of streams. In the south the summer shepherds' huts reach a level of 2,950 metres.

Olympus [38], because of the steepness of its slopes above the 1,000 metre level, is entirely uninhabited. On the western side, Kokkinopolis lies on the 1,100 metre level, to the south — the highest settlement does not go higher than the 800 metre level.

On the isolated volcanoes of Etna and Vesuvius, the steep slopes and lack of soil are also the reason for the low limit of habitation. Etna is surrounded by a circle of large communities and townships which, however, do not go higher than the 800 metre level. Bronte is situated at a height of 793 metres. On Vesuvius, settlements go no higher than the 500 metre level.

Table 51

Vertical distribution of population on the slopes of Mount Vesuvius

| Level m | Area in sq.km | Population | Density of popul. per sq.km |
|------------|---------------|------------|--------------------------------|
| 100—200 | 58 | 29,647 | 508 |
| 200—400 | 36 | 3,366 | 94 |

Milojevic [48] maintains that shepherds' huts in the mountains of Yugoslavia, on the highest massif of Durmitor (2,522 metres) go up to a height of 1,800 metres, while small settlements are to be found below the 1,500 metre level (Podgora village — 1,450 m). At the close of the nineteenth century there were but a few shepherds' sheds there.

3. THE SOVIET UNION

The Soviet Union must be discussed separately, since it would be difficult to include it as a whole in Europe or Asia, and to divide it into two parts would not be the proper method either.

Table 52

Vertical distribution of population of the USSR (about 1945)

| Level m | Area in sq.km | Population | Density of pop. per sq.km | % of pop. | % of area |
|------------|------------------|-------------|---------------------------------|-----------|-----------|
| Depression | 269,000 | 1,540,000 | 5.7 | 0.7 | 1.2 |
| 0— 100 | 3,789,000 | 48,830,000 | 12.9 | 24.4 | 17.4 |
| 100— 200 | 6,212,000 | 87,990,000 | 14.2 | 44.0 | 28.6 |
| 200— 500 | 5,840,000 | 47,270,000 | 8.1 | 23.5 | 26.6 |
| 500—1000 | 3,352,000 | 11,070,000 | 3.3 | 5.5 | 15.4 |
| 1000—1500 | 1,297,000 | 3,080,000 | 2.4 | 1.5 | 5.9 |
| 1500—2000 | 563,000 | 740,000 | 1.3 | 0.3 | 2.6 |
| Above 2000 | 503,000 | 270,000 | 0.54 | 0.1 | 2.3 |
| Total | 21,825,000 | 200,790,000 | 9.2 | 100.0 | 100.0 |

One is struck by the considerable number of inhabitants living in the Caspian Depression. Half of this number is accounted for by Astrakhan and Baku.

The vertical distribution of the population differs widely in the different republics of the USSR. For example, in the Ukrainian SSR, the situation is similar to that in Poland. The 200-500 metre altitude range covers densely populated areas of chernozem soils and the Carpathians foothills, as well as almost the whole of the Donbas, whereas on the 0—100 metre level lie the Pontian Steppes of a poor water regime.

Table 53

Vertical distribution of population in the Ukrainian SSR

| Level m | Area in | | Population | | Density of population per sq. km |
|--------------|----------------|--------------|-------------------|--------------|--|
| | sq. km | % | number | % | |
| 0— 100 | 130,000 | 22.5 | 7,580,000 | 18.6 | 58.3 |
| 100— 200 | 272,000 | 47.2 | 18,300,000 | 45.0 | 67.3 |
| 200— 300 | 114,000 | 19.8 | 14,180,000 | 34.8 | 90.3 |
| 300— 500 | 43,000 | 7.4 | | | |
| 500—1000 | 12,000 | 2.1 | 590,000 | 1.5 | 49.1 |
| Above 1000 | 5,500 | 1.0 | 50,000 | 0.1 | 9.5 |
| Total | 576,500 | 100.0 | 40,700,000 | 100.0 | 70.6 |

In the Byelorussian SSR, the capital Minsk lies on the highest level, and other urban settlements are also situated on high ground which contributes to the considerable density of population on higher levels.

In the other republics, particularly the southern ones, relations are different.

The urban population of the Soviet Union, in connection with the planned industrialisation there, has trebled as compared to pre-revolution times and is more uniformly distributed over the whole area of this state. In table 54 only towns with more than 50,000 inhabitants have been taken into account. Owing to the predominance of lowlands and thanks to the existence of four port towns with more than half a million inhabitants each—78 per cent of the urban population live on levels of up to 200 metres. But the higher levels also account for a very considerable number of the urban population. There are 21 cities with more than 50,000 inhabitants situated on altitudes of over 500 metres. Their total population is 1,820,000. Erevan — (980 metres) — has 200,000 inhabitants; Alma-Ata (740 metres) — 231,000 inhabitants; Karaganda (530 metres) — 166,000 inhabitants; Samarkhand (688 metres) — 134,000 inhabitants. The town of Leninakan,

at a height of 1,548 metres, has 67,707 inhabitants, and the capital of Tad-jikstan — Stalinabad — is on the 800 metre level.

Table 54

Vertical distribution of towns with more than 50000 inhabitants
in the Soviet Union (1897 and 1939)

| Level m | 1939 | | 1897 | Population rise index (1897—100) |
|----------------|--------------------|------------|------------|--|
| | number of towns | population | population | |
| Depression | 2 | 1,063,000 | 225,000 | 472 |
| 0— 50 | 30 | 8,644,000 | 2,721,000 | 317 |
| 50— 100 | 26 | 3,717,000 | 1,080,000 | 344 |
| 100— 200 | 63 | 13,935,000 | 3,468,000 | 401 |
| 200— 300 | 27 | 3,540,000 | 814,000 | 435 |
| 300— 500 | 11 | 2,266,000 | 589,000 | 386 |
| 500— 700 | 10 | 974,000 | 172,000 | 531 |
| 700—1000 | 6 | 784,000 | 157,000 | 500 |
| Above 1000 | 1 | 68,000 | 10,000 | 680 |
| Not classified | 4 | 316 | 63 | 502 |
| Total | 180 | 35,307,000 | 9,309,000 | 404 |

The socialist economy has activated all economic regions and this has led to a quadruple rise in the population of urban settlements with more than 50,000 inhabitants. The greatest index of increase in population is recorded in towns lying on the 0—50 metre level, and this is linked up with the vast development of the coastal towns in 1897 (Riga, Odessa, Rostov-on-the-Don), as well as with the fact that at that time St. Petersburg was the state capital.

As far as mountain habitation in the Soviet Union is concerned, it should be stated at the outset that the upper limit of habitation in the mountains of Asia is situated much higher than that in Europe. The boundaries of plant cultures and zones in the Caucasus are higher than those in the Alps, and the boundary of habitation lies 500—600 metres higher. In the Altai settlements are to be found on levels of more than 2,200 metres. The highest settlements in the Soviet Union lie in Eastern Pamir, where plateaux predominate, and the relative altitudes vary from 1,000 to 1,500 metres. The Kara Kul settlement on the river of the same name lies at a level of 3,950 metres. The excellent highway built during the third Five-Year Plan across Soviet Pamir runs through a pass at a height of 4,700 metres. This highway is one of the world's highest. It has been established that grain cultivation is possible on an altitude of 3,000 metres [25].

In the Kirgiz Republic 30 per cent of the population [69] live above the 1,500 metre level — the density of population amounting to 2.6 per sq.km. In Soviet Tien Shan there are few settlements which go higher than the 2,000 metre level.

On the other side of Tien Shan — in China — there are no settlements above the 1,000 metre level.

Within the 500 metre contour-line the Caucasus Mountains cover an area of 184,000 sq.km, and excluding the Armenian Highland — 116,000 sq.km. On the 500—1,000 metre altitude range the density of population amounts to 54.7 per sq.km, above 1,000 metres to 16.2 per sq.km.

Characteristic is the picture of relations in the Georgian and Armenian Soviet Socialist Republics as is clearly shown in Table 55.

Table 55

Vertical distribution of population in Georgian and Armenian SSR

| Level m | Area in | | Population | | Density of pop. per sq. km |
|---------------------------|---------------|--------------|------------------|--------------|----------------------------------|
| | sq. km | % | number | % | |
| Georgian Republic* | | | | | |
| 0— 500 | 17,000 | 23.6 | 2,110,000 | 56.9 | 123.5 |
| 500—1000 | 16,400 | 22.6 | 1,020,000 | 27.6 | 62.2 |
| 1000—1500 | 12,000 | 16.6 | 330,000 | 9.1 | 27.5 |
| 1500—2000 | 12,500 | 17.4 | 210,000 | 5.7 | 16.8 |
| Above 2000 | 14,100 | 19.8 | 30,000 | 0.7 | 2.1 |
| Total | 72,000 | 100.0 | 3,700,000 | 100.0 | 51.4 |
| Armenian Republic | | | | | |
| 800—1000 | 3,720 | 12.4 | 350,000 | 27.3 | 94.1 |
| 1000—1500 | 4,170 | 13.9 | 760,000 | 59.4 | 182.2 |
| 1500—2000 | 9,750 | 32.5 | 120,000 | 9.4 | 12.3 |
| 2000—3000 | 11,790 | 39.3 | 50,000 | 3.9 | 4.2 |
| Above 3000 | 570 | 1.9 | — | — | — |
| Total | 30,000 | 100.0 | 1,280,000 | 100.0 | 42.7 |

The upper limit of settlements in the Caucasus reaches the 2,500 metre contour-line. On the Georgian Military Highway, the mail station of Gandaur is situated at a height of 2,158 metres, and the settlement of Kazbek —

* Tcherdantsef "Economic Geography of the USSR", Moscow 1954 — modified.

1,750 metres. On the Ossetinian Military Highway the road through the Mamison Pass runs at a height of 2,825 metres — far higher than that through the Alp passes. In the central Caucasus on the Georgian side settlements are to be found up to an altitude of 2,500 metres. The Ushkul community (2061 metres) includes three ancient settlements with 50 monumental watch-towers. Also in Dagestan, together with grain cultivation, settlements go up to the 2,500 metre level. On the vast Armenian-Georgian plateau 16 settlements are indicated on the 1:1,000,000 map, on levels over 2,000 metres high; on the plateau of the Sevan Lake — 14 settlements.

In the southern Urals, the area lying above the 500 metre altitude covers 33,400 sq.km and is inhabited by 260,000 people. Zlatoust alone, at a height of 574 metres, has 99,272 inhabitants (1939). The 1:1,000,000 map indicates 87 settlements in addition to Zlatoust which are situated above the 500 metre level. Verkhniy Katav lies 800 metres above sea level. One settlement above the 500 metre level reaches the geographical latitude of 55°30'. These are the highest figures for this parallel zone.

Ustinova [90] carried out a thorough survey of the situation in the Altai, both by research on the spot as well as by means of cartometric studies. The area of research was the entire Gorno-Altaiisk mountain region covering 86,000 sq.km. The results of this research are shown in the following table.

Table 56

Vertical distribution of settlements and population in the Altai

| Level m | % of settlements | % of population | Level m | % of settlements | % of population |
|------------|---------------------|--------------------|-------------|---------------------|--------------------|
| 200— 300* | 1.4 | 2.8 | 1,300—1,400 | 1.7 | 1.1 |
| 300— 400 | 14.7 | 14.7 | 1,400—1,500 | 3.3 | 0.8 |
| 400— 500 | 16.4 | 15.1 | 1,500—1,600 | 4.0 | 0.8 |
| 500— 600 | 6.3 | 7.1 | 1,600—1,700 | 1.0 | 0.1 |
| 600— 700 | 6.5 | 8.0 | 1,700—1,800 | 3.1 | 3.5 |
| 700— 800 | 2.0 | 2.8 | 1,800—1,900 | 2.0 | 0.8 |
| 800— 900 | 8.0 | 13.0 | 1,900—2,000 | 1.4 | 0.4 |
| 900—1000 | 9.0 | 12.0 | 2,000—2,100 | 1.0 | 0.3 |
| 1000—1100 | 7.4 | 7.7 | 2,100—2,200 | 0.1 | 0.001 |
| 1100—1200 | 5.0 | 5.2 | above 2,200 | 0.1 | 0.002 |
| 1200—1300 | 5.2 | 2.9 | | | |

The distribution of settlements and population in the Altai is confined to valleys; there are no settlements there on slopes or water-shed ridges.

* Exclusive of the town of Gorno-Altaiisk.

The valleys are isolated, with varying degrees of density. Two levels of greater density of population and settlements can be distinguished here: the 300—500 metre and the 800—1,000 metre altitude ranges. On the 800—1,000 metre altitude range there lie large "steppe" areas, considerable extensions of the bottom of the valleys with intensive agriculture. As in the European mountains, here too, the number of inhabitants of individual settlements diminish with the ascending level, but a considerable leap in this respect is to be noted only above the 1,400 metre level. It is characteristic that the settlements of the Altai go higher than the 2,200 metre level, which fact is noteworthy considering the geographical latitude greater than that of the Carpathians.

4. CERTAIN COUNTRIES OF ASIA

Among Asia's numerous countries some only have been given more detailed attention here, in order to give examples of countries situated in various conditions and representing different economic types. The review begins with the Middle East. In Cyprus, over half of the population live on the lowest level of 0—100 metres, covering about one-quarter of the island. On higher levels the number and density of population drop sharply.

Table 57

Vertical distribution of population in Cyprus (1946)

| Level m | Area in | | Population | | Density of popul. per sq. km |
|------------|---------|-------|------------|-------|------------------------------------|
| | sq. km | % | number | % | |
| 0— 100 | 2,250 | 24.2 | 235,000 | 51.1 | 104.4 |
| 100— 200 | 2,484 | 26.8 | 110,000 | 23.9 | 44.3 |
| 200— 500 | 2,162 | 23.3 | 75,000 | 16.3 | 34.7 |
| 500—1000 | 1,856 | 20.0 | 35,000 | 7.6 | 18.8 |
| 1000—1500 | 476 | 5.1 | 5,000 | 1.1 | 10.5 |
| Above 1500 | 54 | 0.6 | . | . | . |
| Total | 9,282 | 100.0 | 460,000 | 100.0 | 49.6 |

T u r k e y is a high-lying country; considerable concentration of the population is to be found on higher levels.

For the purpose of this work investigations have been made of the vertical distribution of all urban settlements of more than 10,000 inhabitants. In towns of this category lying above the 1,000 metre level, there live 547,000 people (15 per cent of the urban population exclusive

of Istanbul). The 1927 census gave the figure of 365,000, therefore in the course of 18 years there has been a 50 per cent rise, which testifies to the considerable economic stimulating of these high-lying areas. 843,000 people live in towns on the 500—1,000 metre altitude range; here we have a substantial number of towns. Erzerum, lying at a height of 1,892 metres, has a population of 50,900 (1945). The highest lying town is Sarikamis (2,100 metres), with 10,500 inhabitants. It should be borne in mind here that in high-lying Turkish Armenia the population has diminished owing to the deportation of Armenians to the Soviet Union.

Table 58

Vertical distribution of urban population in Turkey (1945)

| Level m | Population | % of total population on this level |
|------------|------------|---|
| 0— 100 | 1,846,000 | } 32 |
| 100— 200 | 219,000 | |
| 200— 300 | 25,000 | } 4.6 |
| 300— 500 | 44,000 | |
| 500— 700 | 224 000 | } 17.0 |
| 700—1000 | 619,000 | |
| 1000—1250 | 371,000 | } 8.6 |
| 1250—1500 | 68,000 | |
| 1500—2000 | 98,000 | 6.5 |
| Above 2000 | 11,000 | 2.2 |
| Total | 3,525,000 | 17.4 |

The line of development of the vertical distribution of population in an economically backward country is shown by Table 59, which depicts the development of the population in the interior of Anatolia in an outstandingly upland and hilly country, with an average altitude of 500—1,500 metres. It is only now that one observes the development of capitalism in Turkey; urbanisation is making little progress. Therefore the higher altitudes do not yield precedence to other areas of the country in population development [98].

The highest situated part is East Anatolia with an average altitude of approximately 1,500 metres, but it is just here that the percentage of population has risen (in relation to the whole state) in the course of the past twenty years, although (as mention has already been made) in 1945 the Armenians were deported to the Soviet Union. In the steppes and sometimes in the desert parts of Central Anatolia, on the other hand, up to 1940 slightly decreasing percentage was recorded.

Table 59

Population development in the interior of Anatolia in the period 1927—1945

| Regions of Anatolia | Population in | | | |
|---------------------|------------------|------------------|------------------|------------------|
| | 1927 | 1935 | 1940 | 1945 |
| | numbers | | | |
| Western | 1,303,000 | 1,504,000 | 1,887,000 | 1,717,000 |
| Central | 3,505,000 | 4,002,000 | 4,298,000 | 4,680,000 |
| Eastern | 1,530,000 | 2,003,000 | 2,240,000 | 2,349,000 |
| South-Eastern | 603,000 | 743,000 | 805,000 | 797,000 |
| Total | 6,947,000 | 8,252,000 | 8,930,000 | 9,542,000 |
| | percentages | | | |
| Western | 9.4 | 9.3 | 8.9 | 9.1 |
| Central | 24.8 | 24.7 | 24.1 | 24.3 |
| Eastern | 11.5 | 12.4 | 12.6 | 12.4 |
| South-Eastern | 4.5 | 4.6 | 5.0 | 4.2 |
| Total | 51.2 | 51.0 | 50.6 | 50.0 |

In the Arabian Peninsula the greatest density of population is to be noted in the 1,500—2,000 metre altitude range, where up to 40 per cent of the population are concentrated.

Table 60

Vertical distribution of the population in the Arabian Peninsula

| Level m | Area in | | Population | | Density of popul. per sq. km |
|--------------|------------------|--------------|------------------|--------------|------------------------------------|
| | sq. km | % | number | % | |
| 0— 200 | 628,000 | 22.2 | 1,020,000 | 11.5 | 1.6 |
| 200— 500 | 576,000 | 20.4 | 870,000 | 9.8 | 1.5 |
| 500—1000 | 940,000 | 33.3 | 1,630,000 | 18.4 | 1.7 |
| 1000—1500 | 477,000 | 16.9 | 1,700,000 | 19.2 | 3.6 |
| 1500—2000 | 98,000 | 3.5 | 2,210,000 | 25.1 | 22.6 |
| 2000—3000 | 82,400 | 2.9 | 1,420,000 | 16.0 | 17.3 |
| Above 3000 | 21,600 | 0.8 | | | |
| Total | 1,823,000 | 100.0 | 8,850,000 | 100.0 | 3.1 |

The exact number of inhabitants of Yemen is unknown. From Wissemann's map [94] (point distribution of population) the following characteristic table has been compiled:

61 per cent of Yemen's population are concentrated above the 1,500 metre level. The capital Sanea estimated to have more than 50,000 inhabitants, lies in the centre of a high plateau (300 sq.km) at an altitude of 2,350 metres and is surrounded by 27 settlements [65]. These settlements lie at the outlet of valleys where many springs are to be found. A considerable role in the localisation of these settlements is played here by water relations (and their great importance is bound up with the low degree of economic development). Between Israel and Jordan is the Dead Sea depression which covers a con-

Table 61
Vertical distribution of population of Yemen

| Level m | Percentage of the total population |
|------------|---------------------------------------|
| 0— 200 | 2.2 |
| 200— 500 | 3.4 |
| 500—1000 | 5.0 |
| 1000—1500 | 28.2 |
| 1500—2000 | 33.0 |
| Above 2000 | 28.2 |

siderable part of the Judean Desert. Of interest here, among the several score settlements, are the towns of Tiberias (— 200 metres), and Jericho (—250 metres), the latter with approximately 2,000 inhabitants. The lowest-lying settlement on the globe is the one situated near the Jordan Bridge 375 metres below sea level.

Hilly, high-lying Iran is a country of comparatively large urban settlements. In the 27 towns of this country with more than 20,000 inha-

Table 62
Vertical distribution of towns with over 20,000 inhabitants in Iran

| Level m | Number of towns | Population | % of population living on this altitude |
|-------------|--------------------|------------|---|
| Up to 200 | 7 | 299,000 | 12.5 |
| 200 — 500 | — | — | — |
| 500 — 1000 | 5 | 322,000 | 12.0 |
| 1000 — 1500 | 9 | 1,087,000 | 17.6 |
| 1500 — 2000 | 6 | 470,000 | 10.0 |
| Above 2000 | — | — | — |
| Total | 27 | 2,178,000 | 12.4 |

bitants, there lives the substantial number of 2,200,000 people, in primitive conditions of backward oriental feudalism. Of significance is the fact that half this urban population live on the 1,000—1,500 metre level.

In the distribution of Iran's total population one is struck by the concentration of the majority of the population on the 500—1,500 metre altitude range. In the Caspian Sea depression, 250,000 people live on the Iranian side (density of population amounts to 36 per sq.km), with about 100,000 people living in the town of Resht.

Table 63

Vertical distribution of population of Iran

| Level m | Area in | | Population | | Density of pop. per sq. km |
|------------|-----------|-------|------------|-------|----------------------------------|
| | sq. km | % | number | % | |
| Depression | 7,000 | 0.4 | 250,000 | 1.5 | 35.7 |
| 0—200 | 82,000 | 5.0 | 1,450,000 | 8.8 | 17.7 |
| 200—500 | 84,000 | 5.2 | 950,000 | 5.8 | 11.3 |
| 500—1000 | 292,000 | 17.9 | 4,700,000 | 28.5 | 16.1 |
| 1000—1500 | 380,000 | 23.4 | 6,500,000 | 39.4 | 17.1 |
| 1500—2000 | 440,000 | 27.0 | 2,200,000 | 13.3 | 5.0 |
| 2000—3000 | 323,000 | 19.9 | } 450,000 | 2.7 | 1.3 |
| Above 3000 | 19,000 | 1.2 | | | |
| Total | 1,627,000 | 100.0 | 16,500,000 | 100.0 | 10.1 |

The exact figure for the population of Afghanistan is also unknown. The 1952 United Nations Demographic Yearbook gives an estimate for ten provinces — in all, 9,997,000 inhabitants, which gives us a certain insight into the distribution of the inhabitants of this high-lying continental country.

The better economically and politically developed areas of Afghanistan are situated in the 1,000—2,000 metre altitude range. The capital — Kabul (about 300,000 inhabitants), lies at a height of 1,850 metres. In the province of Kabul 60 per cent of the population live above the 2,000 metre level; in the Southern province — 45 per cent. In all, 73 per cent of Afghanistan's population live more than 1,000 metres above sea level.

India and Pakistan have been treated together. In Table 64 one can observe the high density of population on the lowest level below 200 metres.

Table 64

Vertical distribution of population of India and Pakistan

| Level m | Area in | | Population | | Density of pop. per sq. km |
|------------|-----------|-------|-------------|-------|----------------------------------|
| | sq. km | % | number | % | |
| 0—200 | 1,370,000 | 35.3 | 227,000,000 | 56.8 | 165.7 |
| 200—500 | 1,320,000 | 34.0 | 119,700,000 | 29.9 | 90.7 |
| 500—1000 | 670,000 | 17.2 | 44,600,000 | 11.1 | 66.6 |
| 1000—1500 | 164,000 | 4.2 | 4,300,000 | 1.1 | 26.1 |
| 1500—2000 | 104,000 | 2.7 | 3,000,000 | 0.8 | 28.8 |
| Above 2000 | 255,000 | 6.6 | 1,400,000 | 0.3 | 5.5 |
| Total | 3,883,000 | 100.0 | 400,000,000 | 100.0 | 103.0 |

Of interest is the vertical distribution of the population in the Himalayas presented in the following table:

Table 65

Distribution of population in the Himalayas above the 1,000 metre level (1931)

| Level m | Area in | | Population | | Density of pop. per sq. km |
|------------|---------|-------|------------|-------|----------------------------------|
| | sq. km | % | number | % | |
| 1000—1500 | 99,600 | 15.1 | 2,860,000 | 52.0 | 28.3 |
| 1500—2000 | 74,300 | 12.1 | 1,760,000 | 30.9 | 23.7 |
| Above 2000 | 447,500 | 72.8 | 970,000 | 17.1 | 2.2 |
| Total | 621,400 | 100.0 | 5,590,000 | 100.0 | 9.0 |

The density of population above the 1,000 metre level is far higher here than in the European mountain systems and in India it amounts to 23 per sq.km as high as the 1,000—2,000 metre level. Even above the 2,000 metre level approximately 1,000,000 people live in the Himalayas. For the purpose of comparison with the figures given in Table 65, we give here figures obtained by the 1891 Census of India*; in the Himalayas and the north-eastern mountain ranges of India 6,543,000 people lived at that time on an area of 390,000 sq.km; the density of population amounted to 17 per sq.km. According to the last census (1941) there were 4,022,000 inhabitants in Kashmir, the density of population amounting to 18.4 per sq.km. As we can see, there are no marked differences on the whole between the figures, and they bear witness to the habitation of the Himalayas on comparatively high altitudes.

The highest levels of human habitation in the Himalayas are to be noted in the valleys of Indus and Sutlej. In the valley of upper Sutlej, above the town of Simla (2,170 metres), there are other five settlements. Still higher, above the town of Rampur (2,121 metres), there are 11 settlements reaching the altitude of 2,785 metres, and then come fourteen settlements going up to the level of 3,200 metres. And lastly, there are eight settlements situated as high as the Tibetan frontier—altogether, 38 settlements shown on the 1:685,000 scale map. On the Tibetan side settlements are to be found going right up to the Sutlej sources, where the comparatively large settlement of Porka lies at a height of 4,603 metres. The settlement of Niukchu (4,888 metres) is situated on the water-shed towards the river Tsangpo. Sikkim, the central state in the Himalayas, has an area of 7,300 sq.km, a population of 122,000 and a density of population of 17 per sq.km. The

* Peterman's *Geographische Mitteilungen, Literaturbericht*, Gotha 1896, p. 171.

Darjeeling, a climatic station of the English colonisers and ten other settlements are situated above the 2,000 metre mark. The highest-lying settlement — Phalung — lies at an altitude of 5,358 metres.

Table 66

Vertical distribution of population of Mongolia (1945)

| Level m | Area in | | Population | | Density of pop. per sq. km |
|------------|-----------|-------|------------|-------|----------------------------------|
| | sq. km | % | number | % | |
| 532—1000 | 233,350 | 15.3 | 90,000 | 10.2 | 0.40 |
| 1000—1500 | 611,750 | 40.0 | 270,000 | 29.9 | 0.44 |
| 1500—2000 | 305,140 | 20.0 | 500,000 | 55.4 | 1.68 |
| 2000—3000 | 342,640 | 22.3 | 40,000 | 4.5 | 0.12 |
| 3000—4000 | 33,760 | 2.4 | — | — | — |
| 4000—4653 | 330 | 0.0 | — | — | — |
| Total | 1,528,000 | 100.0 | 900,000 | 100.0 | 0.59 |

In Mongolia over half the population are concentrated on the 1,500-2,000 metre altitude range.

In People's China approximately 12,600,000 people live more than 2,000 metres above sea level. In China, where loess appears at higher altitudes, as in Kansu and on the belt encircling Tibet, agricultural settlements are to be found very high up. The upper limit of agriculture is in Sikang and Tibet; here barley is cultivated right up to the 4,200—4,600 metre level.

Table 67

Vertical distribution of population of China (about 1940)

| Level m | Area in | | Population | | Density of population per. sq. km |
|-------------|-----------|-------|-------------|-------|---|
| | sq. km | % | number | % | |
| 0 — 150 | 1,246,000 | 12.8 | 239,400,000 | 51.9 | 192.1 |
| 150 — 300 | 435,000 | 4.5 | 52,300,000 | 11.3 | 120.2 |
| 300 — 600 | 1,158,000 | 11.8 | 73,800,000 | 16.0 | 64.2 |
| 600 — 1500 | 3,050,000 | 30.3 | 81,000,000 | 17.5 | 27.5 |
| 1500 — 3000 | 1,180,000 | 12.1 | 12,400,000 | 2.7 | 10.5 |
| Above 3000 | 2,767,000 | 28.5 | 2,800,000 | 0.6 | 1.0 |
| Total | 9,898,000 | 100.0 | 461,700,000 | 100.0 | 47.5 |

Table 68 is a survey of the highest levels of habitation in China. It has been worked out cartometrically on the basis of an American hypsometrical map of China to the 1:400,000 scale.

Table 68

Vertical distribution of population in China above the 1,525 metre level (1940)

| Province | 1,500—2,000 | | | Above 2,000 | | | % of pop. of the province |
|---------------------|---------------|---------------------|---------------------------|---------------|---------------------|---------------------------|---------------------------|
| | Area in sq.km | Population in thous | Density of pop. per sq.km | Area in sq.km | Population in thous | Density of pop. per sq.km | |
| Tsinghai | 157,000 | 1,010 | 6.5 | 540,000 | 200 | 0.4 | 100 |
| Kansu | 234,000 | 3,380 | 14.4 | 75,000 | 30 | 0.4 | 51 |
| Ningsia | 44,000 | 200 | 4.6 | 3,000 | . | . | 19 |
| Sikang | 16,000 | 470 | 29.4 | 356,000 | 500 | 1.4 | 100 |
| Sinkiang | 292,000 | 300 | 1.4 | 558,000 | 100 | 0.2 | 9 |
| Junnan | 248,000 | 2,480 | 10.0 | 16,000 | 10 | 0.6 | 27 |
| Kweichow | 62,000 | 2,040 | 33.0 | — | — | — | 29 |
| Remaining provinces | 237,000 | 1,320 | 5.6 | 140,000 | 200 | 1.4 | . |
| | 1,220,000 | 11,200 | 9.8 | 1,688,000 | 1,040 | 0.6 | . |
| Tibet | 20,000 | 400 | 26.0 | 1,180,000 | 1,600 | 1.4 | 100 |
| Total | 1,240,000 | 11,600 | 10.0 | 2,868,000 | 2,640 | 0.9 | . |

The table shows that six provinces belong to the category of areas in which a considerable percentage of the population live above the 1,525 metre level. Three of these provinces greatly exceed the 1,525 metre altitude — Tsinghai, Sikang and Tibet, with a total population of 4,180,000. The density of population is varied. The greatest is to be found in Kweichow, an old Chinese province which for centuries was known for intensive economy. The province of Sikang was for scores of years under the pressure of strong colonisation proceeding from the densely populated eastern provinces. In Tibet on the 1,525—1,830 metre altitude range there are river valleys in the southern part of the country. The settlements there, whose inhabitants are agricultural people, constitute oases amid the deserts of rocky uplands. For these parts a general density of population has been put at approximately 20 per sq.km. On the 1:4,000,000 map of Tibet about 20 settlements have been marked at levels above 5,000 metres. The upper limit of habitation here reaches altitudes unknown anywhere else. In general, on altitudes above 1,525 metres in China there is an area of 4,100,000 sq.km — 42 per

cent of the whole country, with a population of 15,000,000 — 3.2 per cent of the total.

In the countries of Monsoon Asia agricultural economy is linked with the lowest levels, where the water regime is favourable for the cultivation of rice — the principal occupation of the population in these backward countries. Here also, from Manchuria to Java throughout the 56° longitude, the population is concentrated mainly on the lowest areas. On the 0—200 metre level live a total of 680,000,000 people — 54 per cent of the population on this level throughout the globe.

In Korea and the greater part of China, in Japan, Indonesia and in the Philippines, in Vietnam, in the Malay States, in India and Burma — the situation is the same. These are all outstandingly mountainous countries, but the majority of the population is concentrated in the lowlands, mainly on the 0—100 metre level. On the 0—200 metre level in Korea (Table 69) the density of population amounts to 200; in Taiwan [62], in the western plain — 700, in the mountains in the east — 30; in Japan (excluding Hokkaido) — 740 (Table 73), in China on the 0—150 metre level — 192,1 (Table 67), in India on the 0—200 metre level — 105 (Table 64). For purposes of comparison it must be added that on the plain of the river Po, the area rising from 0 to 200 metres has a density of population amounting to 264 per sq.km, including Milan and five other large cities.

Table 69

Vertical distribution of population of Korea (1940)

| Level m | Area in | | Population | | Density of pop. per sq.km |
|------------|---------|-------|------------|-------|---------------------------------|
| | sq.km | % | number | % | |
| 0— 200 | 87,000 | 40.5 | 17,400,000 | 65.5 | 200.0 |
| 200— 500 | 57,000 | 26.5 | 7,760,000 | 29.2 | 136.1 |
| 500—1000 | 42,000 | 19.5 | 1,400,000 | 5.3 | 33.3 |
| 1000—2000 | 27,000 | 12.6 | | | |
| Above 2000 | 2,000 | 0.9 | — | | |
| Total | 215,000 | 100.0 | 26,560,000 | 100.0 | 123.5 |

The following figures have been obtained for Vietnam: the 0-200 metre elevation range covers 43 per cent of the country's area: the number of inhabitants on this level amounts to 93 per cent of the total population, and the density of population is 142 per sq.km. Even in Indonesia, lying in the very heart of the tropics, where high altitudes have excellent climatic conditions, the majority of the population is to be found concentrated in the lowlands. In Sumatra 788,000 people live on high-lying plateaux above

the 1,000 metre mark, and only 2,500 above the 2,000 metre level. These are fairly accurate figures, calculated from Lehmann's point map [40]. The 1:2,000,000 scale hypsometrical map of Celebes [6] reveals that of the 200 settlements indicated on the map, 40 lie on the 750—1,500 metre range, 20 on the 1,500—2,250 metre range and 3 above 2,250 metres.

The Java volcanoes are uninhabited above the 1,000 metre level; this being due to the fact that soil does not form rapidly on fresh lava. Settlements surround the volcanoes at a height of 600—700 metres. Only here and there are settlements to be found situated higher than the 1,000 metre level, and here the reason can be put down to favourable local conditions.

F. Junghuhn* (Pet. Mitt. 1866, book 12) maintains that cultivated fields disappear as the altitude rises above 1,200 metres, and only single coffee plantations go up to a level of 1,500 metres. An exception here are the Tengger Mountains in the eastern part of the island, where a small number of the population live on heights of 1,370-2,300 metres, and thus above the 2,000 metre level. The whole of this high-mountain range is known here as the "cool zone" and covers barely six thousand hectares of cultivated land. The upper limit is not by any means the climatic limit. It is rather the geomorphological boundary, conditioned by the steepness of the volcanic cones.

Table 70 illustrates the vertical distribution of population in all the islands of Asia inclusive of Indonesia and Japan.

Table 70

Vertical distribution of population in the islands of Asia (1946)

| Level m | Area in | | Population | | Density of pop. per sq.km |
|--------------|------------------|--------------|--------------------|--------------|---------------------------------|
| | sq.km | % | number | % | |
| 0— 200 | 476,000 | 20.7 | 119,020,000 | 65.0 | 250.0 |
| 200— 500 | 710,000 | 30.9 | 38,857,000 | 21.2 | 54.7 |
| 500—1000 | 566,000 | 24.6 | 20,220,000 | 11.1 | 35.7 |
| 1000—1500 | 231,000 | 10.0 | 4,565,000 | 2.5 | 19.8 |
| 1500—2000 | 180,000 | 7.8 | 420,000 | 0.2 | 2.3 |
| Above 2000 | 137,000 | 6.0 | . | . | . |
| Total | 2,300,000 | 100.0 | 183,082,000 | 100.0 | 79.6 |

The situation is the reverse in Ceylon, where the density of population rises with altitude. On levels higher than 1,000 metres the density of population rises with altitude. On levels higher than 1,000 metres the density of population amounts to 165 persons per sq.km.

* Petermann's Geographische Mitteilungen, vol. 12, Gotha 1866.

Table 71

Vertical distribution of population in Ceylon (1946)

| Level m | Area in | | Population | | Density of population per sq.km |
|------------|---------|-------|------------|-------|---------------------------------------|
| | sq.km | % | number | % | |
| 0— 200 | 54,300 | 82.3 | 4,895,000 | 73.5 | 90.2 |
| 200— 500 | 6,000 | 9.1 | 487,000 | 7.3 | 81.2 |
| 500—1000 | 2,160 | 3.2 | 690,000 | 10.4 | 319.4 |
| Above 1000 | 3,540 | 5.4 | 585,000 | 8.8 | 165.4 |
| Total | 66,000 | 100.0 | 6,657,000 | 100.0 | 100.9 |

As far as the distribution of the urban population is concerned one is struck by the concentration of more than 90 per cent of the urban population in coastal towns.

Table 72

Vertical distribution of population in towns of over 6,000 inhabitants in Ceylon (1931)

| Level m | Number of towns | Population | |
|------------|--------------------|------------|-------|
| | | number | % |
| Sea coast | 10 | 437,800 | 91.0 |
| Up to 100 | 1 | 7,800 | 1.6 |
| 100—200 | 2 | 17,200 | 3.6 |
| 200—500 | 1 | 10,200 | 2.1 |
| 500—800 | 1 | 8,100 | 1.7 |
| Total | 15 | 481,100 | 100.0 |

The last in this survey of Asian states to be discussed is the vertical distribution of population in Japan.

In J a p a n the upper limit of habitation is closely bound up with the manner of utilisation of the land and is the upshot of the specific forms of land cultivation. The relations analysed by the Japanese researcher T a n a k a d a t e [88] have been given in Table 73. The great contrast between the habitation of mountains and lowlands is indeed striking. Nowhere in the agricultural areas of Europe are such vast differences in the density of population in various parts of the country to be observed. The Japanese I n u e [31] drew up a map of the density of population in Japan according to communities to the scale 1:1,000,000. While in the lowlands and the coastal belt there are more than 700 inhabitants per sq.km, the

Table 73

Distribution of population of Japan (exclusive of the island Hokkaido) according to configuration (1935)

| Configuration | Area in sq. km | Population | Density of population per sq. km | Rise in pop. in the years 1920—1935 (1920 fig.-100%) |
|---------------|----------------|------------|----------------------------------|--|
| Lowlands | 51,400 | 41,039,000 | 798 | 123.9 |
| Foothills | 63,900 | 13,157,000 | 206 | 108.9 |
| Mountains | 173,100 | 10,386,000 | 60 | 132.2 |
| Total | 288,400 | 64,582,000 | 226 | 115.9 |

interior mountainous regions (totalling approximately 40,000 sq.km) have a density of population lower than 25 per sq.km.

The upper limit of mountain habitation has been marked out by Komaki [72]. On seven sheets of a 1:50,000 topographical map he found 66 settlements above the 1,000 metre contour-line, and only four above 1,300 metres. He accepted this contour-line to be the upper limit of permanent habitation in Japan. The greater part of the settlements on this level are connected with the many warm and mineral springs. The highest of them is to be found at the altitude of 2,080 metres. There is one agricultural settlement at the altitude of 1,440 metres, specialising in silk-worm breeding; the population of another settlement at the altitude of 1,480 metres is engaged in the production of charcoal and lime-burning. Many settlements above the 1,300 metre altitude range lie on main land routes. But the number of settlements above the 1,300 metre mark is small. Komaki concludes from this that the upper limit of mountain habitation in Japan "is not a biological limit, but an economic one".

Table 74

Decrease of population in the mountainous areas of Japan in the years 1920—1935*

| Select regions | Area in sq. km | Population in 1935 | Density of pop. per sq. km | Drop in relation to 1920 (1920 fig.-100%) |
|-----------------|----------------|--------------------|----------------------------|---|
| Mino Kaga Range | 4,609 | 144,700 | 31.4 | 91.9 |
| Tanta Plateau | 2,169 | 105,600 | 48.7 | 95.1 |
| Ibuki Mt. Range | 406 | 18,700 | 46.1 | 92.2 |
| Abu Region | 890 | 49,500 | 55.6 | 95.1 |

* Source: Saneshige Komaki 1934 [72].

The highest Japanese settlement lies in the centre of the Hondo Island, in the so-called Japanese Alps. The urban settlement of Ilirayu is situated at an altitude of 1,240 metres.

The Fujiyama Volcano, because of its extremely steep slopes, particularly in the south, is uninhabited above the 1,000 metre level. In the south, the wheat fields do not go beyond the 600 metre level, and settlements — the 490 metre level. In the north-east the township of Yamanaka is situated on a lake at a height of 1,030 metres, others encircle the volcano, as in the case of Etna, along the 600—700 metre altitude range. Within the geomorphological boundaries of the volcano, over an area of 1,090 sq.km, live 98,000 rural inhabitants, the density of population amounting to 90 per sq.km.

In the vertical distribution of the population of Japan, the 0—200 metre level stands out as regards the concentration of the population and its density.

Vertical distribution of population of Japan (1948)

Table 75

| Level m | Area in: | | Population | | Density of pop. per sq. km |
|------------|----------|-------|------------|-------|----------------------------------|
| | sq. km | % | number | % | |
| 0— 200 | 115,000 | 31.3 | 59,800,000 | 74.7 | 520.0 |
| 200— 500 | 94,000 | 25.5 | 15,000,000 | 18.7 | 159.6 |
| 500— 1000 | 124,000 | 32.9 | 5,000,000 | 6.3 | 41.3 |
| Above 1000 | 38,000 | 10.3 | 200,000 | 0.3 | 5.3 |
| Total | 368,000 | 100.0 | 80,000,000 | 100.0 | 217.4 |

One of the largest concentrations of population on the 0—100 metre level is the Tokyo Lowland. In 1940, 12,000,000 people lived here on an area of 15,000 sq.km with a density of population amounting to 800 per sq.km.

5. CERTAIN COUNTRIES OF AFRICA

The vertical distribution of the population of Africa is significant insofar as we are dealing here with vast plateaux, where favourable climatic conditions are to be found at high altitudes. But it must be stated that even here hypsometry is a secondary factor, influencing the water regime, which is of greater significance considering the primitive colonial economy prevailing there. A characteristic example is Abyssinia. There the density of population regularly increases with altitude, and the greatest density is to be found on levels of over 2,000 metres (11.4 per sq.km) where the country's capital is situated. An analysis of the hypsometrical

map of Africa to the 1:1,000,000 scale reveals that a large number of settlements are concentrated at the foot of the steps, characteristic of the African plateau. These are slopes with an abundant rainfall where the sources of numerous streams are to be found. Along the steep slope over the town of Harrar (1,956 metres) are about 30 larger settlements. The same picture is to be observed on the other step of Ankober-Addis-Abeba.

Table 76

Vertical distribution of population of Abyssinia 1936 (without Erythrea)

| Level m | Area in | | Population | | Density of pop. per sq. km. |
|------------|---------|-------|------------|-------|-----------------------------------|
| | sq. km | % | number | % | |
| 0— 200 | 231,000 | 25.5 | 520,000 | 9.3 | 12.2 |
| 200— 500 | | | | | |
| 500—1000 | | | | | |
| 1000—1500 | 216,000 | 23.8 | 850,000 | 15.2 | 3.9 |
| 1500—2000 | 222,000 | 24.5 | 1,530,000 | 27.3 | 6.9 |
| Above 2000 | 237,000 | 26.2 | 2,700,000 | 48.2 | 11.4 |
| Total | 906,000 | 100.0 | 5,600,000 | 100.0 | 6.2 |

It must be stated that in Abyssinia the limit of plant cultivation [36] is lower than in South America or Asia (Tibet, Ladak, Nepal). The average temperature in summer, +10°C, is recorded at heights of up to 1,450 metres, while the boundary of forests is situated at the 3,600 metre mark.

In the Sudan, the largest number of inhabitants live on the 200—500 metre level, although the greatest density of population is to be found on the lowest level of 0—200 metres.

Table 77

Vertical distribution of population of the Sudan (1947)

| Level m | Area in | | Population | | Density of pop. per sq. km |
|------------|-----------|-------|------------|-------|----------------------------------|
| | sq. km | % | number | % | |
| 0— 200 | 22,000 | 0.9 | 120,000 | 1.6 | 5.5 |
| 200— 500 | 1,330,000 | 53.1 | 4,980,000 | 66.0 | 3.7 |
| 500—1000 | 1,054,000 | 42.1 | 2,350,000 | 31.1 | 2.2 |
| 1000—1500 | 74,000 | 2.9 | 90,000 | 1.2 | 1.2 |
| 1500—2000 | 21,000 | 0.8 | 10,000 | 0.1 | 0.5 |
| Above 2000 | 5,000 | 0.2 | . | . | . |
| Total | 2,506,000 | 100.0 | 7,550,000 | 100.0 | 3.0 |

The isolated steep Kilimanjaro is uninhabited on higher levels and on its northern slopes. On the southern and south-eastern sides, on levels from 1,000 to 1,800 metres, in the zone of abundant rainfall, up to 80,000 inhabitants are to be found concentrated on an area of 800 sq.km. Gillman's map [21] indicates here a belt 10 kilometres wide with a density of population of over 150 per sq.km. Above the 2,000 metre mark there begin the tropical jungles and all traces of human life disappear.

In Nigeria and the Cameroons the greatest density of population is evident on the lowest level of 0—200 metres, and the next characteristic level is the 500—1,000 metre altitude range.

Table 78

Vertical distribution of population of Nigeria and the Cameroons (1943)

| Level m | Area in: | | Population | | Density of pop. per sq km |
|------------|----------|-------|------------|-------|---------------------------------|
| | sq. km | % | number | % | |
| 0— 200 | 248,000 | 25.8 | 9,720,000 | 42.7 | 39.2 |
| 200— 500 | 509,000 | 52.9 | 8,295,000 | 36.4 | 16.3 |
| 500—1000 | 170,000 | 17.7 | 4,590,000 | 20.1 | 27.0 |
| 1000—1500 | 23,000 | 2.4 | 170,000 | 0.7 | 7.4 |
| 1500—2000 | 10,000 | 1.0 | 15,000 | 0.1 | 1.5 |
| Above 2000 | 2,000 | 0.2 | | | |
| Total | 962,000 | 100.0 | 22,790,000 | 100.0 | 23.4 |

In the Belgian Congo and Ruanda high density of population of over 100 per sq.km is recorded as high as the 1,500—2,000 metre level. Such high density of population on this altitude is an exceptional phenomenon, nowhere else to be observed.

Table 79

Vertical distribution of population of the Belgian Congo and Ruanda (1940)

| Level m | Area in: | | Population | | Density of pop. per sq. km |
|------------|-----------|-------|------------|-------|----------------------------------|
| | sq. km | % | number | % | |
| 0— 200 | 11,000 | 0.4 | 40,000 | 0.3 | 3.6 |
| 200— 500 | 776,000 | 32.4 | 2,876,000 | 20.6 | 3.7 |
| 500—1000 | 1,149,000 | 47.9 | 5,446,000 | 39.0 | 4.7 |
| 1000—1500 | 404,000 | 16.9 | 1,957,000 | 14.0 | 4.8 |
| 1500—2000 | 34,000 | 1.4 | 3,580,000 | 25.7 | 105.3 |
| Above 2000 | 23,000 | 1.0 | 55,000 | 0.4 | 2.4 |
| Total | 2,397,000 | 100.0 | 13,954,000 | 100.0 | 5.8 |

Similar relations are to be noted in Angola [81]. Here the density of population is not more than 3 per sq.km, right up to the 1,500 metre mark. On levels above 1,500 metres we observe a sharp leap to 8.2 per sq.km. The upland of Angola drops in a system of steps towards the dry trade-wind face of the continent; consequently, these steps are extremely sparsely populated. Denser population begins only on the plateau plains.

Vertical distribution of population of Angola (1940)

Table 80

| Level m | Area in: | | Population | | Density of pop. per sq. km |
|------------|-----------|-------|------------|-------|----------------------------------|
| | sq. km | % | number | % | |
| 0— 200 | 71,000 | 5.7 | 230,000 | 6.2 | 3.3 |
| 200— 500 | 34,000 | 2.7 | 80,000 | 2.1 | 2.4 |
| 500—1000 | 316,000 | 25.4 | 910,000 | 24.3 | 2.9 |
| 1000—1500 | 732,000 | 58.7 | 1,750,000 | 46.8 | 2.4 |
| Above 1500 | 94,000 | 7.5 | 770,000 | 20.6 | 8.2 |
| Total | 1,247,000 | 100.0 | 3,740,000 | 100.0 | 3.0 |

The relations in South Africa are also characteristic. On the 100—500 metre level the density of population amounts to 4.6 per sq.km, on the 500—1,000 metre level — to 5.2; on higher levels it rises in leaps, going up to 31 per sq.km on the 1,500—2,000 metre altitude range.

This is by no means a phenomenon conditioned by climate. On the barren plateau, scarce in water, capitalist economy has concentrated large masses of

Vertical distribution of population in the Union of South Africa (1936)

Table 81

| Level m | Area in: | | Population | | Density of pop. per sq. km |
|------------|-----------|-------|------------|-------|----------------------------------|
| | sq. km | % | number | % | |
| 0— 200 | 55,800 | 4.6 | 1,525,000 | 15.8 | 27.3 |
| 200— 500 | 75,000 | 6.2 | 1,175,000 | 12.2 | 15.7 |
| 500—1000 | 379,000 | 31.0 | 1,740,000 | 18.6 | 4.7 |
| 1000—1500 | 492,000 | 40.3 | 2,575,000 | 26.7 | 5.2 |
| 1500—2000 | 209,000 | 17.1 | 2,530,000 | 26.2 | 12.1 |
| Above 2000 | 10,200 | 0.8 | 45,000 | 0.5 | 4.4 |
| Total | 1,221,000 | 100.0 | 9,630,000 | 100.0 | 7.9 |

population engaged in mining. Along the well-known gold bearing ridge of Witwatersrand on the 1,600—1,800 metre altitude range, lie seven towns along a line of 75 kilometres, with Johannesburg in the centre. The total population is over a million including more than 600,000 Negroes.

The situation in the Transvaal; a land of gold exploitation and Negro labour, is presented in the following table.

Table 82

Vertical distribution of population in the Transvaal (1936)

| Level m | Area in: | | Population | | Density of pop. per sq. km |
|--------------|----------------|--------------|------------------|--------------|----------------------------------|
| | sq. km | % | number | % | |
| 0— 200 | 800 | 0.3 | . | . | . |
| 200— 500 | 23,000 | 8.0 | 115,000 | 3.4 | 5.0 |
| 500—1000 | 51,000 | 17.8 | 490,000 | 14.7 | 9.6 |
| 1000—1500 | 124,000 | 43.4 | 950,000 | 28.4 | 7.7 |
| 1500—2000 | 86,000 | 30.1 | 1,770,000 | 53.0 | 20.6 |
| Above 2000 | 1,200 | 0.4 | 15,000 | 0.5 | 12.5 |
| Total | 286,000 | 100.0 | 3,340,000 | 100.0 | 11.3 |

The 1,500-2,000 metre level has a density of population of 20.6 per sq.km, which is quite a considerable figure for African relations. The climatic conditions are extremely unfavourable here, and the mortality rate higher than in other parts of the Union of South Africa.

Basutoland is a high-lying country, where the density of population on high altitudes is fairly large.

In the Union of South Africa the coastal belt is marked by a considerable percentage of urban population, concentrated in fairly large towns.

Table 83

Vertical distribution of population in Basutoland (1936)

| Level m | Area in | | Population | | Density of pop. per sq. km |
|--------------|---------------|--------------|----------------|--------------|----------------------------------|
| | sq. km | % | number | % | |
| 1,500—2,000 | 12,000 | 40.0 | 377,000 | 67.3 | 31.4 |
| Above 2,000 | 18,000 | 60.0 | 183,000 | 32.7 | 10.2 |
| Total | 30,000 | 100.0 | 560,000 | 100.0 | 18.7 |

On the steep upland slope level (100—1,000 metres) both the number and the percentage of urban population are comparatively small. It is only on the plateau that larger settlements are to be found. Mention has already been made of the concentration of nearly 1,000,000 urban inhabitants — 31 per cent of the total population in South Africa on this level — on altitudes above 1,500 metres.

Table 84

Vertical distribution of towns with over 5,000 inhabitants
in the Union of South Africa (1936)

| Level m | Number of towns | Population | % of population on the resp. level |
|---------------|-----------------|------------------|---------------------------------------|
| 0— 200 | 7 | 808,000 | 53.0 |
| 200— 500 | 7 | 80,000 | 6.8 |
| 500—1000 | 6 | 99,000 | 5.7 |
| 1000—1500 | 23 | 474,000 | 18.4 |
| Above 1500 | 13 | 964,000 | 38.1 |
| Not indicated | 1 | 22,000 | . |
| Total | 57 | 2,447,000 | 25.7 |

In conclusion mention must be made of Madagascar where, as in other countries of Africa already described, a greater density of population is to be noted in altitudes above 1,000 metres. On the 1:1,000,000 scale map 25 settlements have been marked on the Tananarive massif on the 1,500—2,000 metre level, and two settlements even higher than 2,000 metres.

Table 85

Vertical distribution of population of Madagascar (1946)

| Level m | Area in | | Population | | Density of pop. per sq. km |
|--------------|----------------|--------------|------------------|--------------|----------------------------------|
| | sq. km | % | number | % | |
| 0— 200 | 165,000 | 27.9 | 1,285,000 | 30.0 | 7.8 |
| 200— 500 | 155,800 | 26.3 | 628,000 | 14.5 | 4.0 |
| 500—1000 | 135,400 | 22.9 | 1,270,000 | 29.6 | 9.4 |
| 1000—1500 | 106,200 | 17.9 | 1,032,000 | 24.0 | 9.7 |
| 1500—2000 | 27,120 | 4.6 | 80,000 | 1.9 | 2.9 |
| Above 2000 | 2,480 | 0.4 | . | . | . |
| Total | 592,000 | 100.0 | 4,295,000 | 100.0 | 7.2 |

6. NORTH AMERICA

Of North America only the population in the United States and Mexico is surveyed here.

"Die Bevölkerung der Erde" by Behm-Wagner-Supan [8] presents a number of figures for the United States, from four censuses from 1870 to 1900, consideration being given to the vertical distribution of the population.

Table 86

Changes in the vertical distribution of the population in the United States of America in the years 1880—1900*

| Level m | 1900 | | 1880 | Rise in pop. in the period 1880—1900 (1880 = 100) |
|------------|------------|----------------------------------|------------|--|
| | Population | Density of pop. per sq. km | Population | |
| 0— 30 | 12,104,000 | 25 | 9,152,000 | 132.3 |
| 30— 150 | 16,612,000 | 17 | 10,775,000 | 154.2 |
| 150— 300 | 29,402,000 | 21 | 19,026,000 | 154.5 |
| 300— 450 | 11,173,000 | 11 | 7,904,000 | 141.4 |
| 450— 600 | 3,120,000 | 5 | 1,877,000 | 166.3 |
| 600— 900 | 1,568,000 | 2 | 665,000 | 235.8 |
| 900—1200 | 390,000 | 0.7 | 128,000 | 304.7 |
| 1200—1500 | 500,000 | 0.7 | 167,000 | 299.4 |
| 1500—1800 | 434,000 | 0.8 | 271,000 | 160.1 |
| 1800—2100 | 303,000 | 0.8 | 95,000 | 318.9 |
| 2100—2400 | 182,000 | 0.7 | 15,000 | 121.3 |
| 2400—2700 | 99,540 | 1.0 | 25,000 | 398.7 |
| 2700—3000 | 65,300 | 1.0 | 26,800 | 243.6 |
| Above 3000 | 42,000 | 1.2 | 26,400 | 159.1 |

These figures illustrate changes which took place in a period of intensive settlement in the hilly and up-land Western states. From an analysis of the figures given it can be observed that the line of development goes in a zig-zag for it is a reflection of the chaotic colonial settlement which was characteristic in the nineteenth and even in the twentieth century for the colonial dislocation of the population in America. The changes which in the period under review took place in the number of inhabitants on particular hypsometrical levels, are extremely important. From the 900 metre level upwards one can observe a very marked rise: in 1870, no more than 372,000

* Source: Behm-Wagner-Supan "Bevölkerung der Erde" [8].

Table 87

Vertical distribution of population in the United States of America (1945)

| Level m | Area in: | | Population | | Density of pop. per sq. km |
|-------------|-----------|-------|-------------|-------|----------------------------------|
| | sq. km | % | number | % | |
| 0 — 100 | 1,080,000 | 14.0 | 45,300,000 | 32.3 | 42.0 |
| 100 — 200 | 860,000 | 11.2 | 23,700,000 | 16.9 | 27.5 |
| 200 — 500 | 2,140,000 | 27.8 | 58,600,000 | 41.9 | 27.4 |
| 500 — 1000 | 1,250,000 | 16.3 | 8,000,000 | 5.7 | 6.4 |
| 1000 — 1500 | 1,020,000 | 13.3 | 2,000,000 | 1.4 | 2.0 |
| 1500 — 2000 | 780,000 | 10.1 | 1,900,000 | 1.4 | 2.4 |
| Above 2000 | 560,000 | 7.3 | 500,000 | 0.4 | 0.9 |
| Total | 7,690,000 | 100.0 | 140,000,000 | 100.0 | 18.2 |

people lived above the 900 metre mark in the United States. In 1900, more than 2,000,000 lived above this level — the index of rise amounting to 540 (taking the figure of 1870 as 100). In other words, the population of the United States living on levels above 900 metres rose more than five times in the period from 1870 to 1900. Considering that in this same period the population of the whole country did not even double (the index of rise amounted to 197), we may conclude that the settlement of higher levels in the last quarter of the nineteenth century was extremely intensive here. This is bound up with the fact that low-lying areas, more suitable to settlement, were already inhabited. In the 1900-1940 period, the quantitative development of the population on levels above 1,500 metres proceeded more in accord with the general population development in the United States.

Table 88

Habitation on levels from 0—150 metres and above 1,500 metres in the United States of America in the years 1880—1940

| Year | Level 0—150 m | Level above 1,500 m |
|------|---------------|---------------------|
| | Population | Population |
| 1880 | 19,927,000 | 459,000 |
| 1900 | 28,716,000 | 1,126,000 |
| 1940 | 56,740,000 | 2,422,000 |

Whereas the index of population rise for the whole country amounted to 173, the index of rise for the number of population on levels above 1,500 metres amounted to 215 (taking the 1900 figure as 100). The settling

on higher altitudes is still continuing, in result of which the centre of habitation moved to the west and thus towards mountainous and upland areas in the decade from 1940 to 1950.

The vertical distribution of towns in the United States was investigated by W. Winid. Table 88 reveals that on levels higher than 457 metres there are 286 towns with a population of over 10,000 each. The highest lying city (1603 metres above sea level) is Denver, which has a quarter of a million inhabitants.

At present, the greatest density of population in the United States is on the 0—100 metre level, although the largest number of inhabitants is to be found on the 200—500 metre altitude range.

Latin America has vast areas of high uplands and plateaux, frequently with a greater population than lower-lying area. But also here the distribution of settlements is linked up with water regimes. This is the case all over the uplands, from Mexico to Chile. Despite Huntington's

Table 89

Vertical distribution of towns in the United States of America*

| Level m | Towns with population of | | | | | Total |
|------------|--------------------------|-----------------|------------------|-------------------|--------------------|-------|
| | 10—25 thous. | 25—50 thous. | 50—100 thous. | 100—250 thous. | over 250 thous. | |
| 0—46 | 8 | 3 | — | — | 1 | 12 |
| 46—91 | 8 | 1 | 1 | 2 | — | 12 |
| 91—183 | 14 | 4 | 1 | — | — | 19 |
| 183—305 | 59 | 12 | 7 | 3 | 1 | 82 |
| 305—457 | 168 | 60 | 24 | 17 | 14 | 283 |
| Above 457 | 154 | 51 | 32 | 23 | 20 | 283 |
| Total | 411 | 131 | 65 | 45 | 36 | 688 |

"theories" on climatic energy, we can observe development of higher culture both on the high and cool uplands inhabited by the Aztecs, and on the low-lying hot areas inhabited by the Mayas. The Spanish conquest disorganised and partially destroyed the forms of settlement created in the course of centuries on various levels. Unplanned colonial settlement began, today still disorganised by the capitalist economy. Particularly on the higher altitudes of Latin America do we note chaos in today's habitation brought about by the semi-colonial economic relations prevailing there.

* Source: W. Winid „Stany Zjednoczone Ameryki Północnej” (United States of America) (Wielka Geografia Powszechna), p. 148.

Table 90

Vertical distribution of population in Mexico (1940)

| Level m | Area in | | Population | | Density of pop. per sq. km |
|------------|-----------|-------|------------|-------|----------------------------------|
| | sq. km | % | number | % | |
| 0— 200 | 415,000 | 21.1 | 2,840,000 | 14.5 | 6.8 |
| 200—5000 | 263,000 | 13.3 | 1,200,000 | 6.1 | 4.6 |
| 500—1000 | 295,000 | 15.0 | 1,940,000 | 9.9 | 6.6 |
| 1000—1500 | 410,000 | 20.8 | 3,800,000 | 19.3 | 9.3 |
| 1500—2000 | 273,000 | 13.9 | 4,870,000 | 24.8 | 17.8 |
| Above 2000 | 313,000 | 15.9 | 5,000,000 | 25.4 | 16.0 |
| Total | 1,969,000 | 100.0 | 19,650,000 | 100.0 | 10.0 |

In Mexico, 14,000,000 people, i. e. 70 per cent of the country's population, live on altitudes above the 1,000 metre mark. The capital of Mexico, with 2,000,000 inhabitants, lies at a height of 2,400 metres above sea level. In Mexico 5,000,000 people, — one-sixth of the total population at this level throughout the world, live on altitudes above 2,000 metres.

As regards the distribution of urban population, still more evident is the considerable habitation of high levels.

In Mexico, 65 per cent of the population of all the towns, which in 1940 had over 10,000 inhabitants each, live above the 1,500 metre level. And this percentage is rising annually together with the increase in the capital's population. The 1950 census showed the figure of 2,943,000 inhabitants in the Federal District. This is worthy of note, and the only fact of its kind, since here the concentration of nearly 3,000,000 people is to be observed on a comparatively small area. The density of population at the 2,200 metre level is as high as 42,000 per sq.km. In addition, other towns on this altitude have 450,000 inhabitants. The highest situated towns are Toluca de Lerdo, (2,680 metres above sea level) with 43,400 inhabitants, and Pachueca (2,448 metres above sea level) with 54,000 inhabitants. The low altitudes in Mexico, with the exception of the oil region of Veracruz, are economically backward and, what consequently follows, poorly urbanised. Therefore the percentage of urban population there is small, not even reaching 10 per cent.

In Guatemala the situation is typical of the Central American countries. Here the density of population on particular levels rises in leaps, and at altitudes higher than 2,000 metres reaches the number of 86.0 inhabitants per sq.km, the highest figure on a world scale. The characteristic level here

Table 91

Vertical distribution of towns with over 10,000 inhabitants in Mexico (1940)

| Level m | Towns | Population | % of population on the resp. level |
|---------------|-------|------------|---------------------------------------|
| 0 — 100 | 17 | 493,000 | 24.5 |
| 100 — 200 | 3 | 63,000 | 8.0 |
| 200 — 500 | 6 | 115,000 | 9.6 |
| 500 — 1000 | 7 | 292,000 | 15.1 |
| 1000 — 1500 | 13 | 390,000 | 10.3 |
| 1500 — 2000 | 28 | 962,000 | 20.0 |
| Above 2000 | 14 | 1,889,000 | 37.8 |
| Not indicated | 9 | 134,000 | . |
| Total | 97 | 4,344,000 | 22.1 |

is 500—1,000 metres, where 43 per cent of all the settlements in this country are to be found. But the capital of the republic — Guatemala — lies still higher (1,448 metres above sea level).

Table 92

Vertical distribution of population of Guatemala (1945)

| Level m | Area in | | Population | | Density of population per sq. km |
|-------------|---------|-------|------------|-------|--|
| | sq. km | % | number | % | |
| 0 — 200 | 37,000 | 33.9 | 110,000 | 3.0 | 3.0 |
| 200 — 500 | 26,000 | 23.9 | 310,000 | 8.4 | 12.0 |
| 500 — 1000 | 12,000 | 11.0 | 600,000 | 16.2 | 50.0 |
| 1000 — 2000 | 20,000 | 18.3 | 1,480,000 | 40.0 | 74.0 |
| Above 2000 | 14,000 | 12.9 | 1,200,000 | 32.4 | 86.0 |
| Total | 109,000 | 100.0 | 3,700,000 | 100.0 | 34.0 |

Central America is a country with high-lying towns. In Honduras, for instance, 70 per cent of larger settlements are situated on levels above 500 m (as calculated on a 1:1,000,000 map).

In the islands of Central America, the plantation economy depending on the demand in United States markets for vegetable raw materials which are principally cultivated on lower altitudes, leads to a concentration of the population on those levels. This explains why, for instance, in Cuba only some 9 per cent of the population live above the 300 metre mark [86],

Vertical distribution of population of Colombia (1945)

Table 93

| Level m | Area in | | Population | | Density of pop. per sq. km |
|------------|-----------|-------|------------|-------|----------------------------------|
| | sq. km - | % | number | % | |
| 0— 200 | 474,000 | 41.6 | 1,630,000 | 15.7 | 3.5 |
| 200— 500 | 306,000 | 26.9 | 850,000 | 8.2 | 2.8 |
| 500—1000 | 123,000 | 10.8 | 1,100,000 | 10.6 | 9.0 |
| Above 1000 | 236,000 | 20.7 | 6,800,000 | 65.5 | 28.9 |
| Total | 1,139,000 | 100.0 | 10,380,000 | 100.0 | 9.1 |

and even on the mountainous island of Haiti barely 15 per cent of the population live above the 500 metre level.

7. SOUTH AMERICA

Still more contrasting relations are to be noted in South America. In Colombia six departmental towns [4], situated above the 1,500 metre level, have 530,000 inhabitants.

Table 94

Vertical distribution of population in towns of over 10,000 inhabitants in Colombia (1950)

| Level m | Number of towns | Population | |
|------------|-----------------------|------------|--------------------------------|
| | | number | % of total urban population |
| 0— 200 | 14 | 636,000 | 14.1 |
| 200— 500 | 7 | 196,000 | 4.7 |
| 500—1000 | 4 | 60,000 | 1.4 |
| 1000—1500 | 10 | 624,000 | 11.2 |
| 1500—2000 | 4 | 369,000 | 8.8 |
| Above 2000 | 18 | 1,056,000 | 25.2 |
| Total | 57 | 2,941,000 | 65.4 |

The area above 1,000 metres amounts to 21 per cent of the country concentrating 66 per cent of the population, its density amounting to 29 inhabitants per sq.km. Similar figures are recorded for Ecuador.

The situation in Peru on altitudes above 2,000 metres is shown in table 96, which has been worked out according to the altitudes of the departmental towns [2].

Table 95

Vertical distribution of population of Ecuador (1945)

| Level m | Area in | | Population | | Density of pop. per sq. km |
|------------|---------|-------|------------|-------|----------------------------------|
| | sq. km | % | number - | % | |
| 0—1000 | 175,000 | 63.5 | 1,380,000 | 40.6 | 7.9 |
| 1000—2000 | 32,000 | 11.8 | 440,000 | 12.9 | 12.8 |
| Above 2000 | 68,000 | 24.7 | 1,580,000 | 46.5 | 23.3 |
| Total | 275,000 | 100.0 | 3,400,000 | 100.0 | 12.4 |

Table 96

Vertical distribution of population of Peru (1940)

| Level m | Area in | | Population | | Density of pop. per sq. km |
|---------------------------|---------|---------------|------------|---------------|----------------------------------|
| | sq. km | % of total | number | % of total | |
| 2000—2500 | 68,490 | 5.5 | 760,000 | 10.9 | 11.1 |
| 2500—3000 | 70,850 | 5.7 | 1,069,000 | 15.3 | 15.1 |
| 3000—3500 | 89,480 | 7.1 | 1,373,000 | 19.4 | 15.3 |
| 3500—4000 | 106,750 | 8.5 | 1,089,000 | 15.6 | 10.2 |
| Above 4000 | 32,800 | 2.6 | 144,000 | 2.1 | 4.4 |
| Total for above levels | 368,370 | 29.4 | 4,435,000 | 63.3 | 12.0 |

The area of a department varies from 2,000 to 7,000 sq.km; 1,250,000 people live on levels above the 3,500 metre mark. The departmental town of Carabaya is situated at a level of 4,636 metres. The department covers an area of 6,100 sq.km and has 26,543 inhabitants. The density of population amounts to 4.3 per sq.km. The department of Pasco has 117,000 inhabitants, and the same density of population. In the department of Cusco on a height of 3,400 metres, the density of population amounts to 22.2 per sq.km. In the department of Azangaro (departmental town on an altitude of 2,859 metres) there live 113,000 people, and the density of population there amounts to 43.2 per sq.km. This is the largest figure for such a height.

In Peru the distribution of departmental towns is as follows:

With the exception of the coastal departments, almost all the others are situated above the 2,000 metre mark. According to the Peruvian statistical year book, the town of Bapis lies at a height of 5,225 metres. This is a very considerable altitude.

Vertical distribution of departmental towns in Peru

Table 97

| Level m | Number of towns | Level m | Number of towns |
|------------|-----------------|------------|-----------------|
| 0— 500 | 27 | 2500—3000 | 21 |
| 500—1000 | 5 | 3000—3500 | 24 |
| 1000—1500 | 1 | 3500—4000 | 19 |
| 1500— 2000 | 6 | above 4000 | 5 |
| 2000—2500 | 14 | | |
| Total | | | 122 towns |

In Peru, the settlements above the 4,000 metre mark are dispersed as single farmsteads [9], which here and there go up to the level of 4,600 metres. According to *Sievers* [78], on the upper boundary of the "inhabited area" above the 4,000 metre level, the inhabitants grow only potatoes and here and there rhubarb. Below 4,000 metres there begin the "old Peruvian" alimentary plants, such as variation of *Chenopodium quinoa*; below 3,300 metres — maize; below 2,700 metres — wheat, sugar cane, as well as mediterranean and tropical fruit trees.

Here attention must be drawn to the highest-lying mining town in the world — Cerro de Pasco (4,360 metres) with 15,000 inhabitants (in 1870 it had 6,418 inhabitants). The number of the population here is extremely changeable and depends entirely on the productivity of the silver mines. As new abundant veins are discovered, entrepreneurs and workers pour in in great numbers, and as output drops, they again scatter [92].

In Peru (according to the author's calculations), in the period from 1862 to 1940, the lower levels, where the country's capital is also situated, were marked by considerably greater growth of population than the high-lying areas. This was a sign of their economic development. Beginning with the 2,500 metre level, the increase in population is comparatively small, lower than the average for the whole country.

The country with the highest-lying permanent and large settlements is Bolivia. Although only 23 per cent of its area rises above 2,000 metres, 71 per cent of the population live there. These are areas by no means privileged as regards climate, soil or plant life. On the uplands inhabited even above the 4,000 metre mark, the average monthly maximum temperature is approximately 6°C, and the fluctuations per 24 hours are 20° to 26°, nowhere else to be observed on inhabited parts of the earth. The water regime is also unfavourable. The main reason which drew the colonial population

Table 98

Changes in the vertical distribution of the population of Peru
in the years 1862—1940

| Level m | Population | | | | Index of rise of popu- lation in the years 1862—1940 (1862 fig. = = 100%) |
|------------|------------|-------|-----------|-------|---|
| | 1940 | | 1862 | | |
| | number | % | number | % | |
| 0— 100 | 990,000 | 14.2 | 305,000 | 13.3 | 324.7 |
| 100—1000 | 1,214,000 | 17.4 | 183,000 | 8.0 | 663.4 |
| 1000—2000 | 327,000 | 4.7 | 87,000 | 3.8 | 375.9 |
| 2000—2500 | 760,000 | 10.9 | 225,000 | 9.8 | 337.8 |
| 2500—3000 | 1,069,000 | 15.4 | 454,000 | 19.7 | 235.5 |
| 3000—3500 | 1,373,000 | 19.7 | 594,000 | 25.8 | 231.1 |
| 3500—4000 | 1,089,000 | 15.6 | 383,000 | 16.6 | 285.3 |
| Above 4000 | 144,000 | 2.1 | 70,000 | 3.0 | 205.7 |
| Total | 6,966,000 | 100.0 | 2,301,000 | 100.0 | 302.7 |

here and still constitutes the economic basis of the country, is the mining of metal ores — 90 per cent of the value of Bolivian exports. Mineral products provide thus the sole basis for the considerable number of population of regions lying at those high altitudes. The Altiplano basins of Bolivia the bottoms of which are above 4,000 metres, have a density of population of over 20 per sq.km. The Titicaca Lake, the largest high-mountain lake in the world, situated 3,813 metres above sea level, is a busy interstate transport route. On its coastal belt, the density of population varies from 40—50 inhabitants per sq.km. Along the mountain slopes encircling it, are terraced barley, potatoes and quinoa fields; even wheat and maize ripen there.

Table 99

Vertical distribution of population of Bolivia

| Level m | Area in | | Population | | Density of pop. per sq. km |
|------------|-----------|-------|------------|-------|----------------------------------|
| | sq. km | % | number | % | |
| 0— 200 | 255,000 | 23.0 | 30,000 | 0.7 | 1.2 |
| 200— 500 | 398,000 | 37.0 | 334,000 | 8.0 | 0.8 |
| 500—1000 | 78,000 | 7.2 | 150,000 | 3.6 | 1.9 |
| 1000—2000 | 52,000 | 5.2 | 327,000 | 7.9 | 6.3 |
| 2000—3000 | 53,000 | 5.3 | 902,000 | 21.7 | 17.0 |
| 3000—4000 | 131,000 | 12.1 | 2,036,000 | 49.0 | 15.5 |
| 4000—5000 | 85,000 | 8.0 | 378,000 | 9.1 | 4.4 |
| Above 5000 | 24,000 | 2.2 | . | . | . |
| Total | 1,076,000 | 100.0 | 3,779,000 | 100.0 | 4.9 |

Of Bolivia's nine provinces, the five most densely populated lie above the 3,400 metre level, and 17 per cent of the urban settlements — according to Bowman — are situated above 4,000 metres.

The highest-lying settlements are connected with mining. The town of Potosi [92], famous in the period of Spanish colonialism and in that of cruel slave labour in America, had, as has been estimated, 160,000 inhabitants in 1611. From all regions of the "vice-kingdom" of Peru Indians were driven here as slave labour, for the mines. Tens of thousands of them died annually. This was one of the principal causes of the horrifying mortality rate of the Indians, in the seventeenth and eighteenth centuries. Potosi was then the largest city of America. It is situated at an altitude of 4,070 metres. Today it has 40,000 inhabitants, which also is a large figure for such a height.

This is by no means the upper altitude limit for hard mining work performed by man in the service of capital. The mining settlement of Aullagas, officially referred to as a "pueblo", that is a village, is situated on a height of 4,790 metres; Indians live here in hard toil despite physiologists' argument claiming that insufficient quantity of oxygen of which the atmosphere on this height has half the normal amount, brings about the mountain sickness.

In the crater of the Popocatepetl (Mexico), at a height of 5,420 metres, temporary miners' settlements are to be found, where the inhabitants are engaged in the extraction of sulphur. So far, this is the highest limit of economic work in the open air, without use being made of oxygen apparatus.

In Brazil, the characteristic level is the 500—1,000 metre mark, where the coffee plantations are situated. Nearly 20 per cent of the population of the South American continent live here, which illustrates the fact that economic relations are the factor determining the distribution of population.

Table 100
Vertical distribution of population of Brazil (1936)

| Level m | Area in | | Population | | Density of pop. per sq. km |
|------------|-----------|-------|------------|-------|----------------------------------|
| | sq. km | % | number | % | |
| 0— 100 | 1,896,000 | 22.3 | 13,768,000 | 32.3 | 7.3 |
| 100— 200 | 1,573,000 | 18.5 | 3,358,000 | 7.9 | 2.1 |
| 200— 500 | 3,076,000 | 36.1 | 8,108,000 | 19.0 | 2.6 |
| 500—1000 | 1,751,000 | 20.6 | 16,562,000 | 38.8 | 9.4 |
| 1000—1500 | 200,000 | 2.3 | 833,000 | 1.9 | 4.2 |
| Above 1500 | 15,000 | 0.2 | 40,000 | 0.1 | 2.7 |
| Total | 8,511,000 | 100.0 | 42,669,000 | 100.0 | 5.0 |

Vertical distribution of popu

| Level m | Up to 40° South latitude | | | |
|--------------|--------------------------|--------------|-------------------|--------------|
| | Area in | | Population | |
| | sq. km | % | number | % |
| 0— 200 | 962,000 | 44.6 | 12,287,000 | 77.0 |
| 200— 500 | 510,000 | 23.6 | 1,680,000 | 10.5 |
| 500—1000 | 220,000 | 10.2 | 1,247,000 | 7.8 |
| 1000—2000 | 201,000 | 9.3 | 689,000 | 4.3 |
| 2000—3000 | 68,000 | 3.2 | 58,000 | 0.4 |
| 3000—4000 | 63,000 | 2.9 | . | . |
| Above 4000 | 134,000 | 6.2 | . | . |
| Total | 2,158,000 | 100.0 | 15,961,000 | 100.0 |

In the southern hemisphere, with the exception of the island of Java, the only large lowland concentration of population is the Argentine, where 12,000,000 people — 77 per cent of the population — live on the 0—200 metre level. Excluding Patagonia south of 40° where on an area of 639,000 sq.km 150,000 people live, it is to be observed that there is another characteristic level in the Argentine, namely the 500—1,000 metre range. In all, we are dealing here with chaotic young colonial settlement organization with immature forms, which have created conditions for plunder exploitation of the geographical environment.

In colonial countries the urban population is in the overwhelming majority concentrated on low coastal levels. In the Argentine which is by no

T a b l e 102
Vertical distribution of population in towns of more than
10,000 inhabitants in Argentine (1950)

| Level m | Number of towns | Population | |
|--------------|--------------------|------------------|--------------|
| | | number | % |
| Buenos Aires | 1 | 2,981,000 | 43.9 |
| 0— 50 | 34 | 1,627,000 | 23.9 |
| 50— 100 | 23 | 675,000 | 10.0 |
| 100— 200 | 15 | 328,000 | 4.8 |
| 200— 500 | 9 | 700,000 | 10.3 |
| 500—1000 | 13 | 372,000 | 5.5 |
| Above 1000 | 2 | 108,000 | 1.3 |
| Total | 97 | 6,791,000 | 100.0 |

means a purely lowland country, 87 per cent of the population live on the 0—200 metre altitude, and even exclusive of Buenos Aires, more than half of the town population are concentrated on this level.

ation of the Argentine (1945)

Table 101

| Density of pop. per sq. km | South of 40° South latitude | | | | Total area in sq. km |
|----------------------------------|-----------------------------|-------|------------|-------|-------------------------|
| | Area in | | Population | | |
| | sq. km | % | number | % | |
| 12.8 | 130,000 | 20.3 | 90,000 | 61.7 | 1,092,000 |
| 3.3 | 180,000 | 28.2 | 30,000 | 20.5 | 690,000 |
| 5.7 | 220,000 | 34.4 | 20,000 | 13.7 | 440,000 |
| 3.4 | 106,000 | 16.6 | 6,000 | 4.1 | 307,000 |
| 0.9 | 3,000 | 0.5 | — | — | 71,000 |
| . | — | — | — | — | 63,000 |
| . | — | — | — | — | 134,000 |
| 7.4 | 639,000 | 100.0 | 146,000 | 100.0 | 2,797,000 |

8. AUSTRALIA

In Australia a large percentage of the urban population has developed under the influence of colonial and one-sided economy. More than half the population of the whole continent is concentrated in the five capitals of the states, while of the total number of inhabitants living on the 0—100 metre level, 75 per cent are urban. Also on the higher levels the percentage of urban population is higher than elsewhere. For example, 31 per cent of the population above the 500 metre mark live in towns with more than 5,000 inhabitants.

Table 103

Vertical distribution of towns with over 5000 inhabitants in Australia (1947)

| Level m | Number of towns | Urban population | % of population on the resp. level |
|------------|-----------------|------------------|---------------------------------------|
| 0—100 | 27 | 4,272,000 | 75 |
| 100—200 | 14 | 124,000 | 19.4 |
| 200—500 | 13 | 225,000 | 26 |
| Above 500 | 13 | 140,000 | 31 |
| Total | 67 | 4,761,000 | 62.6 |

In South Australia about 25,000 people — over 5 per cent of the total urban population live in towns more than 300 metres above sea level (excluding the capital Adelaide).

Table 104

Vertical distribution of population of towns in South Australia (1947). All towns

| Level m | Number of towns | Population |
|-------------------------------|-----------------|----------------|
| 0— 46 | 39 | 82,700 |
| 46— 91 | 12 | 19,300 |
| 91—183 | 11 | 8,400 |
| 183—305 | 14 | 14,400 |
| 305—457 | 21 | 19,000 |
| Above 457 | 4 | 6,700 |
| Not classified | 5 | 4,200 |
| Total | 106 | 154,700 |
| Adelaide | 1 | 382,500 |
| Total urban population | 107 | 537,200 |

The countries of Australia and Oceania do not have high compact elevations. The Australian Cordillera nowhere exceeds heights where the climate in these geographical latitudes might constitute an obstacle to human habitation, and their extremely sparse population is due purely to factors of economic and social nature. Approximately half a million people live above the 500 metre mark in the Cordillera on an area of 400 000 sq.km. The density of population does not even reach 2 per sq.km — the lowest figure for this level in the southern hemisphere in the sub-tropical belt.

Table 105

Vertical distribution of population in the Australian Cordillera above the 500 metre level (1947)

| Level m | Area in sq.km | Population number | Density of pop. per sq.km |
|--------------|------------------|----------------------|------------------------------|
| 500—1000 | 342,000 | 450,000 | 1.3 |
| 1000—1500 | 57,000 | — | — |
| Above 1500 | 1,500 | — | — |
| Total | 402,000 | 450,000 | 1.1 |

Among the large islands of Oceania the mountainous New Zealand is the most sparsely populated [18]. In the mountainous "alpine" districts of the South Island, only a few settlements are to be found above the 500 metre level, with but twenty to eighty inhabitants. The highest-lying, Hermitage goes up to the 800 metre level with a population of 79, and here one should note the drop in population as compared with 1936. The settlement of Bealey on a pass (640 metres above sea level), through which runs a transversal railway line, has 65 inhabitants. In all, the four "alpine" districts of New Zealand (Fiord, Lake, Vincent and Mackenzie) had a total of 3,669 inhabitants in 1945 on an area of 31,760 sq.km. as compared with 4,248 inhabitants in 1936. In the district of Fiord, which has an area of 7,780 sq.km, there lived only eight inhabitants as compared with 19 in 1936.

North Island has a larger number of inhabitants, but in the central volcano district of Taupo there are only 4,248 inhabitants, on an area of 8,120 sq.km.

9. VERTICAL DISTRIBUTION OF LARGE TOWNS ON THE GLOBE

A short description should also be given of the vertical distribution of towns situated on particularly high altitudes.

The vertical distribution of large towns in the world was examined by the Swiss Gobet at the beginning of the twentieth century [23]. But since then profound social and economic changes have taken place. The author of this work has revised Gobet's data and undertaken new research, taking into account large towns lying above the 1,000 metre level, as well as towns with a population from 50,000 to 100,000, situated above the 2,000 metre level (Tables 106 and 107).

In all, 44 large towns with a total of 14,000,000 inhabitants, are to be found on levels above the 1,000 metre mark. About the year 1900, it is certain that they did not have more than approximately 3,000,000 inhabitants. The considerable development, which is to be observed over the past fifty years, is a proof that their economic activity is not in the least hampered by their hypsometrical position. They cover 3 to 4 per cent of all large towns on the globe, and a little smaller percentage of its inhabitants. 24 towns lie outside the tropics, of which 20 in the northern hemisphere; among them Tehran (1,000,000 inhabitants) must be mentioned. In the southern hemisphere, Johannesburg has more than 800,000 inhabitants.

Among the 18 towns, within the tropics, Mexico City is worthy of note. Ulan-Bator and Calgary are situated farthest to the north, Johannesburg to the south.

Large towns situated above the 1000 metre level

| Geographical latitude | Town | Country | Height above sea level m | Population | |
|-----------------------|----------------------|-------------|--------------------------|------------|--------------|
| | | | | 1950 | approx. 1900 |
| N.51°—40° | Calgary | Canada | 1,032 | 100,004 | 4,152 |
| | Salt Lake City | USA | 1,310 | 182,121 | 58,024 |
| | Erevan | USSR | 984 | 200,000 | 29,033(1897) |
| | Kweisui | China | 1,057 | 150,000 | . |
| | Tatung | China | 1,439 | 228,000 | . |
| | Ulan Bator | Mongolia | 1,385 | 100,000 | . |
| N.40°—23°30' | | | | | 12—15,000 |
| | Kweiyang | China | 1,095 | 271,000 | . |
| | Lanchow | China | 1,554 | 397,000 | . |
| | Sining | China | 1,886 | 240,000 | 100,000 |
| | Kunming | China | 1,950 | 300,000 | 60,000 |
| | Yunnan | China | 1,950 | 350,000 | . |
| | Katmandu | Nepal | 1,498 | 108,805 | 50,000 |
| | Patan | Nepal | 1,400 | 104,928 | 50,000 |
| | Srinagar | India | 1,893 | 207,787 | 122,618 |
| | Kabul | Afghanistan | 1,850 | 300,000 | . |
| | Tehran | Iran | 1,132 | 989,871 | 280,000 |
| | Tabriz | Iran | 1,343 | 213,542 | 200,000(?) |
| | Meshed | Iran | 1,030 | 169,000 | 60,000 |
| | Shiraz | Iran | 1,580 | 129,023 | 50,000 |
| | Hamadan | Iran | 1,950 | 103,874 | 30,000 |
| | Isfahan | Iran | 1,586 | 204,598 | 70,000 |
| Denver | USA | 1,607 | 415,780 | 133,859 | |
| N.23°30'—0° | Mengtsy | China | 1,440 | 250,000 | . |
| | Linngan | China | 1,493 | 150,000 | . |
| | Bangalore | India | 950 | 406,860 | 159,046 |
| | Addis Ababa | Abyssinia | 2,424 | 300,000 | . |
| | Asmara | Abyssinia | 2,371 | 100,000 | . |
| | Mexico City | Mexico | 2,240 | 1,655,300 | 344,721 |
| | (Federation District | „ | „ | 2,942,594) | . |
| | Gaudalajara | Mexico | 1,560 | 273,400 | 101,208 |
| | Puebla | Mexico | 2,162 | 156,700 | 93,521 |
| | San Luis Potosi | Mexico | 1,877 | 100,000 | 61,019 |
| | Guatemala | Guatemala | 1,488 | 283,100 | 75,000 |
| S.0°—23°30' | Nairobi | Kenya | 1,675 | 118,976 | . |
| | Tananarive | Madagascar | 1,220 | 238,000 | 50,000 |
| | Bogota | Colombia | 2,640 | 543,600 | 120,000 |
| | Medellin | Colombia | 1,540 | 264,600 | 53,000 |
| | Manizales | Colombia | 2,155 | 130,100 | 15,000 |
| | Quito | Ecuador | 2,850 | 212,873 | 80,000 |
| | La Paz | Bolivia | 3,620 | 319,600 | 34,697 |

cont. Tab. 106

| Geographical latitude | Town | Country | Height above sea level m | Population | |
|-----------------------|--------------|---------------|--------------------------|------------|----------------|
| | | | | 1950 | approx. 1900 |
| S.23°30'—30° | Johannesburg | Union of S.A. | 1,733 | 830,000 | 158,580 (1904) |
| | Pretoria | Union of S.A. | 1,360 | 244,887 | 36,700 (1904) |
| | Springs | Union of S.A. | 1,700 | 111,141 | . |
| | Germiston | Union of S.A. | 1,710 | 131,618 | . |

Table 107

Towns with 50—100,000 inhabitants, situated above the 2,000 metre level

| Town | Country | Elevation above sea level m | Number of population to 1950 |
|------------|----------|-----------------------------|------------------------------|
| Toluca | Mexico | 2,680 | approx. 50,000 |
| Pachuca | Mexico | 2,448 | 53,353 |
| Pasto | Colombia | 2,593 | 68,500 |
| Cuenca | Ecuador | 2,536 | 54,000 |
| Cusco | Peru | 3,360 | 53,200 |
| Arequipa | Peru | 2,300 | 93,400 |
| Oruro | Bolivia | 3,706 | 52,000 |
| Cochabamba | Bolivia | 2,557 | 80,000 |
| Potosí | Bolivia | 3,945 | 47,000 |

Among the towns with over 50,000 inhabitants, Potosí is a noteworthy example, lying at a height of nearly 4,000 metres. In all, seventeen relative great cities lie above the 2,000 metre mark, with a total of about 6,000,000 inhabitants — 17 per cent of the population on this level.

V. CONCLUSION

Among world regions inhabited by man, there are some lying on levels from 300 metres below sea level, on the bridge over the Jordan, where normal atmospheric pressure amounts to 800 mm, and others reaching up to a height of 5,000 metres in the rocky, cold and snow-covered highlands of Tibet, Bolivia and Peru, where the pressure of the air is 400 mm, in social relations created by himself and in extremely diverse conditions of geographical environment.

On all these hypsometrical levels, man created a high material and spiritual culture as long ago as the times of antiquity and in the early stages of various economic formations. There were and still are the most widely differing manifestations of this culture and its influence makes itself felt on geographical environment in a multitude of ways. But there is no doubt whatsoever, that difficulties entailed in the exploitation of this environment and adaptation to it, within the defined social formation, are magnified together with the rise in altitude. An expression of these difficulties is the absolute and relative numerical diminution of the density of population, as the hypsometrical levels of the globe rise.

It is evident from the total world figures (Tables 1 and 2) that 56 per cent of the world's population live on the 0—200 metre altitude range; this is double the percentage of the area of the respective range (27.8). We also observe here the highest density of population of all levels (34.8), more than double the world average. On the 200—500 metre elevation range the percentage figure for the area and population on this range is more or less the same: this applies both to Europe and North America, Africa and Asia. Only in South America is the situation different. Beginning with the 1,000 metre level, the density of population drops at a fairly slow rate, varying between 9 and 8 inhabitants per sq.km. On altitudes above 2,000 metres the proportion of the percentage of area to the percentage of population on the given level amounts to 10:2, while on the 0—200 metre range it amounts to 1:2. In other words, above the 2,000 metre mark there is ten times as much area per capita as in the lowlands. This is also reflected in the population density figure which amounts to an average of about 4 inhabitants per sq.km on heights above 2,000 metres. For every thousand persons in inhabited country, 15 people live on relatively high levels. But the density of population on these highlands, too, varies widely, and the characteristics of population distribution as well as urban settlements are very uneven — depending on the manner in which the geographical environment is exploited by diverse human societies.

GENERAL TABLES

EUROPE (exclusive of

| Countries | Depression | % | 0—100 m | % | 100—200 m | % |
|---------------------------------|------------|------|-------------|-------|-------------|------|
| Albania | — | — | 330 000 | 29.2 | 160 000 | 14.2 |
| Andorra | — | — | — | — | — | — |
| Austria | — | — | — | — | 1 340 000 | 19.3 |
| Belgium | 50 000 | 0.6 | 7 085 000 | 83.9 | 614 000 | 7.3 |
| Bulgaria | — | — | 1 100 000 | 15.9 | 1 680 000 | 24.4 |
| Czechoslovakia | — | — | — | — | 2 310 000 | 19.1 |
| Denmark | — | — | 4 015 000 | 99.3 | 30 000 | 0.7 |
| Finland | — | — | 3 250 000 | 83.6 | 587 000 | 15.1 |
| France | — | — | 19 300 000 | 47.7 | 9 060 000 | 22.4 |
| Gibraltar | — | — | 18 000 | 81.8 | 4 000 | 18.2 |
| Greece | — | — | 3 650 000 | 50.2 | 1 020 000 | 14.1 |
| Spain | — | — | 7 100 000 | 25.8 | 2 680 000 | 9.8 |
| Holland | 3 970 000 | 40.8 | 5 710 000 | 58.6 | 36 000 | 0.4 |
| Ireland | — | — | 2 443 000 | 82.7 | 390 000 | 13.2 |
| Iceland | — | — | 85 000 | 82.5 | 16 000 | 15.5 |
| Yugoslavia | — | — | 3 230 000 | 21.1 | 4 070 000 | 26.6 |
| Liechtenstein | — | — | — | — | — | — |
| Luxemburg | — | — | — | — | 32 000 | 11.0 |
| Malta | — | — | 140 000 | 45.7 | 141 000 | 46.1 |
| Monaco | — | — | 21 000 | 100.0 | — | — |
| Germany | 40 000 | 0.1 | 26 000 000 | 39.9 | 14 400 000 | 22.1 |
| Norway | — | — | 1 753 000 | 56.1 | 802 000 | 25.7 |
| Poland | 27 000 | 0.1 | 4 772 000 | 20.2 | 9 248 000 | 39.1 |
| Portugal (including islands) | — | — | 4 000 000 | 49.1 | 1 550 000 | 19.0 |
| Rumania | — | — | 4 550 000 | 27.7 | 4 660 000 | 28.4 |
| San Marino | — | — | — | — | 10 000 | 66.7 |
| Switzerland | — | — | — | — | — | — |
| Sweden | — | — | 4 974 000 | 74.3 | 1 087 000 | 16.2 |
| Turkey (European part) | — | — | 1 185 000 | 81.2 | 185 000 | 12.7 |
| Vatican | — | — | 1 000 | 100.0 | — | — |
| Hungary | — | — | 2 385 000 | 26.5 | 5 680 000 | 63.1 |
| Great Britain | — | — | 38 150 000 | 81.2 | 7 940 000 | 16.9 |
| Isle of Man and Channel Islands | — | — | 120 000 | 80.0 | 30 000 | 20.0 |
| Italy | — | — | 18 530 000 | 42.1 | 7 080 000 | 16.1 |
| USSR in Europe | 590 000 | 0.4 | 38 590 000 | 25.8 | 78 570 000 | 52.5 |
| Total | 4 677 000 | 0.8 | 202 487 000 | 38.5 | 155 448 000 | 29.5 |

SOVIET

| Countries | Depression | % | 0—100 m | % | 100—200 m | % | 200—500 m |
|-----------|------------|-----|------------|------|------------|------|------------|
| USSR | 1 540 000 | 0.8 | 48 830 000 | 24.3 | 87 990 000 | 43.8 | 47 270 000 |

Table A

the Caucasus)

| 200—500 m | % | 500—1000 m | % | Above 1000 m | % | Total | % |
|-------------|------|------------|------|-----------------|-----|-------------|-----|
| 250 000 | 22.1 | 320 000 | 28.3 | 70 000 | 6.2 | 1 130 000 | 100 |
| — | — | — | — | 5 000 | 100 | 5 000 | 100 |
| 3 669 000 | 52.9 | 1 783 000 | 25.7 | 141 000 | 2.1 | 6 939 000 | 100 |
| 637 000 | 7.4 | 66 000 | 0.8 | — | — | 8 452 000 | 100 |
| 2 400 000 | 34.8 | 1 620 000 | 23.5 | 100 000 | 1.4 | 6 900 000 | 100 |
| 7 730 000 | 63.9 | 2 050 000 | 16.9 | 10 000 | 0.1 | 12 100 000 | 100 |
| — | — | — | — | — | — | 4 045 000 | 100 |
| 50 000 | 1.3 | — | — | — | — | 3 887 000 | 100 |
| 9 240 000 | 22.8 | 2 720 000 | 6.7 | 180 000 | 0.4 | 40 500 000 | 100 |
| — | — | — | — | — | — | 22 000 | 100 |
| 1 270 000 | 17.5 | 1 180 000 | 16.3 | 130 000 | 1.9 | 7 250 000 | 100 |
| 7 620 000 | 27.7 | 9 300 000 | 33.8 | 800 000 | 2.9 | 27 500 000 | 100 |
| 20 000 | 0.2 | — | — | — | — | 9 716 000 | 100 |
| 120 000 | 4.1 | — | — | — | — | 2 953 000 | 100 |
| 2 000 | 2.0 | — | — | — | — | 103 000 | 100 |
| 1 970 000 | 32.5 | 2 780 000 | 18.2 | 250 000 | 1.6 | 15 300 000 | 100 |
| 8 000 | 12.7 | 3 000 | 27.3 | — | — | 11 000 | 100 |
| 255 000 | 87.6 | 4 000 | 1.4 | — | — | 21 000 | 100 |
| 25 000 | 8.2 | — | — | — | — | 306 000 | 100 |
| — | — | — | — | — | — | 21 000 | 100 |
| 19 600 000 | 30.1 | 5 120 000 | 7.8 | 4 000 | — | 65 200 000 | 100 |
| 410 000 | 13.1 | 148 000 | 4.8 | 10 000 | 0.3 | 3 123 000 | 100 |
| 9 173 000 | 38.8 | 411 000 | 1.8 | — | — | 23 631 000 | 100 |
| 1 870 000 | 22.9 | 700 000 | 8.6 | 30 000 | 0.4 | 8 150 000 | 100 |
| 5 650 000 | 34.4 | 1 490 000 | 9.1 | 60 000 | 0.4 | 16 410 000 | 100 |
| 5 000 | 33.3 | — | — | — | — | 15 000 | 100 |
| 2 640 000 | 59.2 | 1 640 000 | 36.8 | 180 000 | 4.0 | 4 460 000 | 100 |
| 583 000 | 8.7 | 54 000 | 0.8 | — | — | 6 698 000 | 100 |
| 88 000 | 6.0 | 2 000 | 0.1 | — | — | 1 460 000 | 100 |
| — | — | — | — | — | — | 1 000 | 100 |
| 930 000 | 10.3 | 5 000 | 0.1 | — | — | 9 000 000 | 100 |
| 890 000 | 1.9 | — | — | — | — | 47 000 000 | 100 |
| — | — | — | — | — | — | 150 000 | 100 |
| 12 530 000 | 28.5 | 5 460 000 | 12.4 | 400 000 | 0.9 | 44 000 000 | 100 |
| 30 940 000 | 20.7 | 950 000 | 0.6 | 20 000 | 0.0 | 149 660 000 | 100 |
| 123 575 000 | 23.5 | 37 807 000 | 7.2 | 2 426 000 | 0.5 | 526 420 000 | 100 |

Table B

UNION

| % | 500— —1000 m | % | 1000— —1500 m | % | 1500— —2000 m | % | 2000 m | % | Total | % |
|------|-----------------|-----|------------------|-----|------------------|-----|---------|-----|-------------|-----|
| 23.6 | 11 070 000 | 5.5 | 3 080 000 | 1.5 | 740 000 | 0.4 | 270 000 | 0.1 | 200 790 000 | 100 |

| Countries | 0—200 m | % | 200—500 m | % | 500—1000 m | % |
|--------------------|-------------|------|-------------|------|-------------|------|
| Aden, Protectorate | | | | | | |
| Perim | 230 000 | 20.9 | 200 000 | 18.2 | 260 000 | 23.6 |
| Afghanistan | — | — | 800 000 | 9.4 | 1 500 000 | 17.6 |
| Arabia | 280 000 | 8.1 | 510 000 | 14.8 | 1 070 000 | 31.0 |
| Bahrein | 125 000 | 100 | — | — | — | — |
| Burma | 13 000 000 | 76.5 | 2 950 000 | 17.3 | 650 000 | 3.8 |
| British Borneo | 700 000 | 70.0 | 150 000 | 15.0 | 100 000 | 10.0 |
| Bhutan | 50 000 | 16.7 | 50 000 | 16.7 | 100 000 | 33.3 |
| Ceylon | 4 895 000 | 73.5 | 487 000 | 7.3 | 690 000 | 10.4 |
| China | 262 000 000 | 56.9 | 92 000 000 | 20.0 | 54 000 000 | 11.7 |
| Cyprus | 340 000 | 73.9 | 80 000 | 17.4 | 30 000 | 6.5 |
| Philippines | 13 300 000 | 74.7 | 3 860 000 | 21.7 | 600 000 | 3.4 |
| Hongkong | 1 600 000 | 88.9 | 200 000 | 11.1 | — | — |
| India-Pakistan | 227 000 000 | 56.7 | 119 700 000 | 29.9 | 44 600 000 | 11.2 |
| French India | 340 000 | 100 | — | — | — | — |
| Portuguese India | 560 000 | 93.3 | 40 000 | 6.7 | — | — |
| Indonesia | 37 000 000 | 50.0 | 19 000 000 | 25.7 | 13 800 000 | 18.6 |
| Iraq | 3 280 000 | 69.8 | 840 000 | 17.9 | 430 000 | 9.1 |
| Iran | 2 400 000 | 13.7 | 1 300 000 | 7.4 | 2 700 000 | 15.4 |
| Israel Jordan | 1 000 000 | 45.9 | 470 000 | 21.5 | 630 000 | 28.9 |
| Japan | 59 800 000 | 74.7 | 15 000 000 | 18.8 | 5 000 000 | 6.2 |
| Ryukyu | 900 000 | 100 | — | — | — | — |
| Yeman | 80 000 | 2.3 | 120 000 | 3.4 | 180 000 | 5.1 |
| Cambodia-Laos | 3 780 000 | 85.3 | 180 000 | 4.1 | 300 000 | 6.8 |
| Qatar | 100 000 | 100 | — | — | — | — |
| Korea | 17 700 000 | 65.5 | 7 800 000 | 28.9 | 1 500 000 | 5.6 |
| Kuwait | 25 000 | 100 | — | — | — | — |
| Lebanon | 600 000 | 50.9 | 400 000 | 33.9 | 140 000 | 11.9 |
| Macao | 370 000 | 100 | — | — | — | — |
| Malaya | 3 600 000 | 75.0 | 1 150 000 | 24.0 | 50 000 | 1.0 |
| Mongolia | — | — | — | — | 90 000 | 10.0 |
| Muscat and Oman | 180 000 | 36.0 | 40 000 | 8.0 | 120 000 | 24.0 |
| Nepal | 2 800 000 | 44.7 | 1 000 000 | 16.0 | 2 000 000 | 31.9 |
| Singapore | 1 000 000 | 100 | — | — | — | — |
| Siam | 9 400 000 | 51.9 | 8 250 000 | 45.6 | 420 000 | 2.3 |
| Syria | 80 000 | 2.7 | 1 250 000 | 41.7 | 1 410 000 | 47.0 |
| Timor (Portuguese) | 360 000 | 80.0 | 80 000 | 20.0 | — | — |
| Turkey | 2 930 000 | 16.9 | 2 710 000 | 15.6 | 4 950 000 | 28.6 |
| Vietnam | 20 432 000 | 92.9 | 800 000 | 3.6 | 640 000 | 2.9 |
| ZSSR (Asian part) | 20 600 000 | 40.9 | 16 240 000 | 32.3 | 10 220 000 | 20.3 |
| Total | 712 805 000 | 56.5 | 297 657 000 | 23.5 | 148 180 000 | 11.7 |

* 1940 figures have been taken for the provinces of China. No new data had been vinces. The difference of 120 000 000 should, in all probability, be distributed on the

Table C

| 1000—1500 m | % | 1500—2000 m | % | 2000 m | % | Total | % |
|-------------|------|-------------|------|------------|------|---------------|-----|
| 210 000 | 19.1 | 180 000 | 16.4 | 20 000 | 1.8 | 1 100 000 | 100 |
| 1 800 000 | 21.2 | 2 400 000 | 28.3 | 2 000 000 | 23.5 | 8 500 000 | 100 |
| 590 000 | 17.1 | 800 000 | 23.2 | 200 000 | 5.8 | 3 450 000 | 100 |
| — | — | — | — | — | — | 125 000 | 100 |
| 340 000 | 2.0 | 60 000 | 0.4 | — | — | 17 000 000 | 100 |
| 50 000 | 5.0 | — | — | — | — | 900 000 | 100 |
| 50 000 | 16.7 | 40 000 | 13.3 | 10 000 | 3.3 | 300 000 | 100 |
| 465 000 | 7.0 | 120 000 | 1.8 | — | — | 6 657 000 | 100 |
| 33 000 000 | 7.2 | 14 000 000 | 3.0 | 5 600 000 | 1.2 | 460 600 000 | 100 |
| 10 000 | 2.2 | — | — | — | — | 460 000 | 100 |
| 40 000 | 0.2 | — | — | — | — | 17 800 000 | 100 |
| — | — | — | — | — | — | 1 800 000 | 100 |
| 4 300 000 | 1.1 | 3 000 000 | 0.8 | 1 400 000 | 0.3 | 400 000 000 | 100 |
| — | — | — | — | — | — | 340 000 | 100 |
| — | — | — | — | — | — | 600 000 | 100 |
| 3 800 000 | 5.2 | 300 000 | 0.4 | 100 000 | 0.1 | 74 000 000 | 100 |
| 120 000 | 2.6 | 30 000 | 0.6 | — | — | 4 700 000 | 100 |
| 6 100 000 | 34.9 | 4 700 000 | 26.9 | 300 000 | 1.7 | 17 500 000 | 100 |
| 80 000 | 3.7 | — | — | — | — | 2 180 000 | 100 |
| 200 000 | 0.3 | — | — | — | — | 80 000 000 | 100 |
| — | — | — | — | — | — | 900 000 | 100 |
| 800 000 | 22.5 | 1 170 000 | 32.9 | 1 200 000 | 33.8 | 3 550 000 | 100 |
| 140 000 | 3.1 | 30 000 | 0.7 | 2 000 | 0.0 | 4 400 000 | 100 |
| — | — | — | — | — | — | 100 000 | 100 |
| — | — | — | — | — | — | 27 000 000 | 100 |
| — | — | — | — | — | — | 25 000 | 100 |
| 25 000 | 2.1 | 12 000 | 1.0 | 3 000 | 0.2 | 1 180 000 | 100 |
| — | — | — | — | — | — | 370 000 | 100 |
| — | — | — | — | — | — | 4 800 000 | 100 |
| 270 000 | 30.0 | 500 000 | 55.6 | 40 000 | 4.4 | 900 000 | 100 |
| 100 000 | 20.0 | 60 000 | 12.0 | — | — | 500 000 | 100 |
| 380 000 | 6.1 | 50 000 | 0.8 | 30 000 | 0.5 | 6 260 000 | 100 |
| — | — | — | — | — | — | 1 000 000 | 100 |
| 30 000 | 0.2 | — | — | — | — | 18 100 000 | 100 |
| 240 000 | 8.0 | 20 000 | 0.6 | — | — | 3 000 000 | 100 |
| — | — | — | — | — | — | 440 000 | 100 |
| 4 600 000 | 26.6 | 1 650 000 | 9.5 | 490 000 | 2.8 | 18 790 000 | 100 |
| 100 000 | 0.5 | 25 000 | 0.1 | 5 000 | 0.0 | 22 000 000 | 100 |
| 2 313 000 | 4.6 | 680 000 | 1.4 | 260 000 | 0.5 | 51 130 000 | 100 |
| 60 150 000 | 4.9 | 29 527 000 | 2.4 | 11 658 000 | 0.9 | 1 260 277 000 | 100 |

published before the conclusion of editorial work as to the population of various pro-
0—200 and 200—500 metre levels.

NORTH

| Countries | 0—200 m | % | 200—500 m | % | 500—1000 m | % |
|--|------------|------|------------|------|------------|------|
| Alaska | 50 000 | 62.5 | 20 000 | 25.0 | 10 000 | 12.5 |
| Antilles (British)* | 800 000 | 76.2 | 170 000 | 16.2 | 80 000 | 7.6 |
| Antilles (French) | 410 000 | 80.4 | 60 000 | 11.8 | 40 000 | 7.8 |
| Antilles (Dutch)** | 130 000 | 86.7 | 20 000 | 13.3 | — | — |
| Costa Rica | 120 000 | 15.6 | 60 000 | 7.8 | 110 000 | 14.3 |
| Dominican Rep. | 1 000 000 | 50.0 | 650 000 | 32.5 | 320 000 | 16.0 |
| Greenland | 20 000 | 100 | — | — | — | — |
| Guatemala | 110 000 | 3.0 | 310 000 | 8.4 | 600 000 | 16.2 |
| Haiti | 1 590 000 | 50.5 | 1 100 000 | 34.9 | 380 000 | 12.1 |
| Honduras | 300 000 | 25.0 | 160 000 | 13.3 | 530 000 | 44.2 |
| Honduras (British) | 60 000 | 100 | — | — | — | — |
| Jamaica | 650 000 | 50.0 | 300 000 | 23.1 | 300 000 | 23.1 |
| Canada | 9 000 000 | 71.4 | 1 700 000 | 13.5 | 1 690 000 | 13.4 |
| Cuba | 3 970 000 | 81.9 | 720 000 | 14.8 | 140 000 | 2.9 |
| Mexico | 3 200 000 | | 1 350 000 | | 2 180 000 | |
| Nicaragua | 500 000 | 45.5 | 260 000 | 23.6 | 300 000 | 27.3 |
| Panama | 560 000 | 80.0 | 140 000 | 20.0 | — | — |
| Puerto Rico and the Virgin Islands | 1 500 000 | 75.0 | 400 000 | 20.0 | 90 000 | 4.5 |
| Salvador | 330 000 | 16.3 | 630 000 | 31.2 | 980 000 | 48.5 |
| United States | 69 000 000 | 49.3 | 58 600 000 | 41.9 | 8 000 000 | 5.7 |
| Panama Canal Zone | 40 000 | 100 | — | — | — | — |
| Trinidad | 500 000 | 89.3 | 60 000 | 10.7 | — | — |
| Total | 93 840 000 | 46.9 | 66 710 000 | 33.3 | 15 750 000 | 7.9 |

* Including the Bahama Islands.

** All the islands of the Caribbean Sea have been treated jointly with North America, the states of South America.

Table D

AMERICA

| 1000—1500 m | % | 1500—2000 m | % | Above 2000 m | % | Total | % |
|-------------|------|-------------|------|-----------------|------|-------------|-----|
| — | — | — | — | — | — | 80 000 | 100 |
| — | — | — | — | — | — | 1 050 000 | 100 |
| — | — | — | — | — | — | 510 000 | 100 |
| — | — | — | — | — | — | 150 000 | 100 |
| 440 000 | 57.1 | 40 000 | 5.2 | — | — | 770 000 | 100 |
| 30 000 | 1.5 | — | — | — | — | 2 000 000 | 100 |
| — | — | — | — | — | — | 20 000 | 100 |
| 900 000 | 24.3 | 580 000 | 15.7 | 1 200 000 | 32.4 | 3 700 000 | 100 |
| 80 000 | 2.5 | — | — | — | — | 3 150 000 | 100 |
| 170 000 | 14.2 | 40 000 | 3.3 | — | — | 1 200 000 | 100 |
| — | — | — | — | — | — | 60 000 | 100 |
| 50 000 | 3.8 | — | — | — | — | 1 300 000 | 100 |
| 210 000 | 1.7 | — | — | — | — | 12 600 000 | 100 |
| 20 000 | 0.4 | — | — | — | — | 4 850 000 | 100 |
| 4 300 000 | 19.3 | 5 420 000 | 24.3 | 5 850 000 | 26.2 | 22 300 000 | 100 |
| 40 000 | 3.6 | — | — | — | — | 1 100 000 | 100 |
| — | — | — | — | — | — | 700 000 | 100 |
| 10 000 | 0.5 | — | — | — | — | 2 000 000 | 100 |
| 80 000 | 4.0 | — | — | — | — | 2 020 000 | 100 |
| 2 000 000 | 1.4 | 1 900 000 | 1.3 | 500 000 | 0.4 | 140 000 000 | 100 |
| — | — | — | — | — | — | 40 000 | 100 |
| — | — | — | — | — | — | 560 000 | 100 |
| 8 330 000 | 4.1 | 7 980 000 | 4.0 | 7 550 000 | 3.8 | 200 160 000 | 100 |

In the „Biuletyn Geograficzny” 1-2, 1953, Trinidad and the Dutch Antillas figure among

SOUTH

| Countries | 0—200 m | % | 200—500 m | % | 500—1000 m | % |
|---------------|-------------------|-------------|-------------------|-------------|-------------------|-------------|
| Argentina | 12 060 000 | 76.7 | 1 680 000 | 10.7 | 1 240 000 | 7.9 |
| Bolivia | — | — | 300 000 | 8.1 | 160 000 | 4.4 |
| Brazil | 18 100 000 | 40.7 | 8 400 000 | 18.9 | 17 100 000 | 38.4 |
| Chile | 2 420 000 | 45.0 | 1 250 000 | 23.2 | 1 420 000 | 26.4 |
| Ecuador | 1 030 000 | 31.2 | 150 000 | 4.5 | 200 000 | 6.1 |
| Falkland Isl. | (2 000) | 100 | — | — | — | — |
| Guiana | 550 000 | 88.7 | 70 000 | 11.3 | — | — |
| Colombia | 1 630 000 | 15.7 | 850 000 | 8.2 | 1 100 000 | 10.6 |
| Paraguay | 840 000 | 71.2 | 340 000 | 28.8 | — | — |
| Peru | 1 600 000 | 21.5 | 650 000 | 8.7 | 230 000 | 3.1 |
| Uruguay | 2 210 000 | 98.2 | 40 000 | 1.8 | — | — |
| Venezuela | 1 360 000 | 31.6 | 1 040 000 | 24.2 | 1 040 000 | 24.2 |
| Total | 41 800 000 | 42.3 | 14 770 000 | 15.0 | 22 490 000 | 22.8 |

AUSTRALIA

| Countries | 0—200 m | % | 200—500 m | % | 500—1000 m | % |
|------------------------|------------------|-------------|------------------|-------------|----------------|------------|
| Australia, Tasmania | 6 360 000 | 82.8 | 870 000 | 11.3 | 450 000 | 5.9 |
| Islands of Oceania | 1 440 000 | 47.7 | 1 030 000 | 34.1 | 450 000 | 14.9 |
| Total | 7 800 000 | 72.9 | 1 900 000 | 17.8 | 900 000 | 8.4 |

Table E

AMERICA

| 1000—1500 m | % | 1500—2000 m | % | Over 2000 m | % | Total | % |
|-------------|------|-------------|------|-------------|------|------------|-----|
| 510 000 | 3.2 | 170 000 | 1.1 | 60 000 | 0.4 | 15 720 000 | 100 |
| 300 000 | 8.1 | 320 000 | 8.7 | 2 610 000 | 70.7 | 3 690 000 | 100 |
| 860 000 | 1.9 | 40 000 | 0.1 | — | — | 44 500 000 | 100 |
| 180 000 | 3.3 | 80 000 | 1.5 | 30 000 | 0.6 | 5 380 000 | 100 |
| 110 000 | 3.3 | 230 000 | 7.0 | 1 580 000 | 47.9 | 3 300 000 | 100 |
| — | — | — | — | — | — | (2 000) | 100 |
| — | — | — | — | — | — | 620 000 | 100 |
| 2 050 000 | 19.8 | 2 580 000 | 24.9 | 2 160 000 | 20.8 | 10 370 000 | 100 |
| — | — | — | — | — | — | 1 180 000 | 100 |
| 120 000 | 1.6 | 430 000 | 5.8 | 4 420 000 | 59.3 | 7 450 000 | 100 |
| — | — | — | — | — | — | 2 250 000 | 100 |
| 500 000 | 11.6 | 320 000 | 7.5 | 40 000 | 0.9 | 4 300 000 | 100 |
| 4 630 000 | 4.7 | 4 170 000 | 4.2 | 10 900 000 | 11.0 | 98 760 000 | 100 |

Table F

AND OCEANIA

| 1000—1500 m | % | 1500—2000 m | % | Over 2000 m | % | Total | % |
|-------------|-----|-------------|---|-------------|---|------------|-----|
| — | — | — | — | — | — | 7 680 000 | 100 |
| 100 000 | 3.3 | — | — | — | — | 3 020 000 | 100 |
| 100 000 | 0.9 | — | — | — | — | 10 700 000 | 100 |

Vertical distribution

Table G

Africa

| Country | 0—100 m | | 100—200 m | | 200—500 m | | 500—1000 m | | 1000—1500 m | | 1500—2000 m | | Over 2000 m | | Total | % |
|-------------------------------|-------------------|-------------|-------------------|------------|-------------------|-------------|-------------------|-------------|-------------------|-------------|-------------------|------------|------------------|------------|--------------------|------------|
| | Popul. | % | Popul. | % | Popul. | % | Popul. | % | Popul. | % | Popul. | % | Popul. | % | | |
| Abyssinia, Eritrea, Somali | 345 000 | 4,4 | 400 000 | 5,1 | 680 000 | 8,6 | 880 000 | 11,1 | 1 130 000 | 14,3 | 1 600 000 | 20,3 | 2 860 000 | 36,2 | *7 895 000 | 100 |
| Algeria | 1 600 000 | 18,3 | 1 740 000 | 20,0 | 1 620 000 | 18,4 | 2 690 000 | 31,0 | 1 010 000 | 11,6 | 60 000 | 0,7 | 4 000 | . | 8 684 000 | 100 |
| Angola | 180 000 | 4,5 | 80 000 | 2,0 | 90 000 | 2,3 | 980 000 | 24,5 | 1 850 000 | 46,2 | 820 000 | 20,5 | — | — | 4 000 000 | 100 |
| Basutoland | — | — | — | — | — | — | — | — | — | — | 410 000 | 67,2 | 200 000 | 32,8 | 610 000 | 100 |
| Bechuanaland | — | — | — | — | — | — | 210 000 | 75,0 | 70 000 | 25,0 | — | — | — | — | 280 000 | 100 |
| Belgian Congo, Ruanda — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| — Urundi | 20 000 | 0,1 | 20 000 | 0,1 | 2 876 000 | 20,6 | 5 446 000 | 38,9 | 1 957 000 | 14,0 | 3 580 000 | 25,6 | 95 000 | 0,7 | 13 994 000 | 100 |
| British Cameroons | 5 000 | 0,6 | 15 000 | 1,7 | 395 000 | 39,6 | 390 000 | 39,3 | 170 000 | 17,2 | 15 000 | 1,6 | — | — | 990 000 | 100 |
| Canary Islands | 440 000 | 55,7 | 150 000 | 19,0 | 120 000 | 15,2 | 65 000 | 8,2 | 15 000 | 1,9 | — | — | — | — | 790 000 | 100 |
| Cap Verde Islands | 80 000 | 44,3 | 40 000 | 22,1 | 50 000 | 27,6 | 11 000 | 6,0 | — | — | — | — | — | — | 181 000 | 100 |
| Egypt | 18 740 000 | 98,2 | 340 000 | 1,8 | — | — | — | — | 7 000 | . | — | — | — | — | 19 087 000 | 100 |
| French Cameroons | 180 000 | 6,6 | 60 000 | 2,2 | 820 000 | 30,0 | 1 270 000 | 46,2 | 360 000 | 13,2 | 50 000 | 1,8 | — | — | 2 740 000 | 100 |
| French Equatorial Africa: | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Chad | — | — | 6 000 | 0,3 | 1 806 000 | 98,7 | 80 000 | 0,4 | 10 000 | 0,6 | — | — | — | — | 1 902 000 | 100 |
| Gabon | 70 000 | 18,2 | 44 000 | 11,5 | 50 000 | 13,0 | 200 000 | 52,1 | 20 000 | 5,2 | — | — | — | — | 384 000 | 100 |
| Middle Congo | 50 000 | 7,0 | 20 000 | 2,8 | 300 000 | 42,2 | 340 000 | 48,0 | — | — | — | — | — | — | 710 000 | 100 |
| Oubangi-Chari | — | — | — | — | 142 000 | 13,4 | 900 000 | 84,7 | 20 000 | 1,9 | — | — | — | — | 1 062 000 | 100 |
| French Morocco | 1 670 000 | 18,6 | 820 000 | 9,1 | 1 850 000 | 20,6 | 3 810 000 | 42,3 | 780 000 | 8,7 | 60 000 | 0,7 | — | — | 8 990 000 | 100 |
| French Togoland | 250 000 | 27,2 | 200 000 | 21,7 | 360 000 | 39,1 | 110 000 | 12,0 | — | — | — | — | — | — | 920 000 | 100 |
| French West Africa: | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Dahomey | 120 000 | 9,3 | 100 000 | 7,8 | 1 069 000 | 82,9 | — | — | — | — | — | — | — | — | 1 289 000 | 100 |
| French Guinea | 200 000 | 9,8 | 165 000 | 8,0 | 650 000 | 31,4 | 790 000 | 38,2 | 260 000 | 12,6 | — | — | — | — | 2 065 000 | 100 |
| French Nigeria | — | — | 250 000 | 13,7 | 1 500 000 | 83,0 | 50 000 | 2,8 | 10 000 | 0,5 | — | — | — | — | 1 810 000 | 100 |
| French Sudan | 80 000 | 2,2 | 250 000 | 7,0 | 3 225 000 | 88,6 | 80 000 | 2,2 | — | — | — | — | — | — | 3 635 000 | 100 |
| Ivory Coast | 400 000 | 10,0 | 231 000 | 5,8 | 3 200 000 | 80,4 | 150 000 | 3,8 | — | — | — | — | — | — | 3 981 000 | 100 |
| Mauritania | 200 000 | 54,0 | 110 000 | 29,7 | 60 000 | 16,3 | — | — | — | — | — | — | — | — | 370 000 | 100 |
| Senegal, Dakar | 1 650 000 | 92,2 | 129 000 | 7,2 | 10 000 | 0,6 | — | — | — | — | — | — | — | — | 1 789 000 | 100 |
| Gambia | 251 000 | 100,0 | — | — | — | — | — | — | — | — | — | — | — | — | 251 000 | 100 |
| Gold Coast, British Togoland | 2 074 000 | 46,4 | 1 200 000 | 26,8 | 1 200 000 | 26,8 | — | — | — | — | — | — | — | — | 4 474 000 | 100 |
| Kenya | 230 000 | 4,4 | 100 000 | 1,8 | 360 000 | 7,0 | 780 000 | 15,7 | 1 900 000 | 36,4 | 1 560 000 | 30,1 | 240 000 | 4,6 | 5 170 000 | 100 |
| Liberia | 400 000 | 26,7 | 200 000 | 13,3 | 870 000 | 58,0 | 30 000 | 2,0 | — | — | — | — | — | — | 1 500 000 | 100 |
| Libya | 270 000 | 27,8 | 80 000 | 8,3 | 450 000 | 46,4 | 160 000 | 16,5 | 10 000 | 1,0 | — | — | — | — | 970 000 | 100 |
| Madagascar | 900 000 | 21,0 | 380 000 | 8,8 | 628 000 | 14,6 | 1 270 000 | 29,6 | 1 032 000 | 24,0 | 80 000 | 1,9 | 5 000 | 0,1 | 4 295 000 | 100 |
| Mauritius | 285 000 | 68,0 | 119 000 | 28,4 | 15 000 | 3,6 | — | — | — | — | — | — | — | — | 419 000 | 100 |
| Mozambique | 1 200 000 | 22,1 | 340 000 | 6,3 | 1 830 000 | 33,6 | 2 000 000 | 36,8 | 80 000 | 0,2 | — | — | — | — | 5 450 000 | 100 |
| Nigeria | 6 400 000 | 29,4 | 3 300 000 | 15,1 | 7 900 000 | 36,3 | 4 200 000 | 19,2 | — | — | — | — | — | — | 21 800 000 | 100 |
| Nyasaland | — | — | — | — | 180 000 | 7,8 | 1 270 000 | 55,2 | 700 000 | 30,4 | 140 000 | 6,1 | 10 000 | 0,5 | 2 300 000 | 100 |
| Portuguese Guinea | 300 000 | 85,5 | 51 000 | 14,5 | — | — | — | — | — | — | — | — | — | — | 351 000 | 100 |
| Réunion | 110 000 | 45,5 | 40 000 | 16,5 | 55 000 | 22,7 | 30 000 | 12,2 | 7 000 | 3,1 | — | — | — | — | 242 000 | 100 |
| Rhodesia, North | — | — | — | — | 5 000 | 0,3 | 200 000 | 12,9 | 1 300 000 | 84,4 | 37 000 | 2,4 | — | — | 1 542 000 | 100 |
| Rhodesia, South | 4 000 | 0,2 | 30 000 | 1,7 | 120 000 | 6,7 | 1 460 000 | 83,0 | 150 000 | 8,4 | — | — | — | — | 1 764 000 | 100 |
| Seychelles | 35 000 | 100,0 | — | — | — | — | — | — | — | — | — | — | — | — | 35 000 | 100 |
| Sierra Leone | 800 000 | 39,0 | 750 000 | 36,6 | 300 000 | 14,6 | 200 000 | 9,8 | — | — | — | — | — | — | 2 050 000 | 100 |
| South-West Africa | 5 000 | 1,3 | 5 000 | 1,2 | 10 000 | 2,5 | 20 000 | 5,0 | 100 000 | 25,0 | 260 000 | 65,0 | — | — | 400 000 | 100 |
| Spanish Guinea | 40 000 | 23,5 | 20 000 | 11,8 | 50 000 | 29,4 | 60 000 | 35,3 | — | — | — | — | — | — | 170 000 | 100 |
| Spanish Morocco | 350 000 | 26,9 | 200 000 | 15,4 | 340 000 | 26,2 | 330 000 | 25,4 | 80 000 | 6,1 | — | — | — | — | 1 300 000 | 100 |
| Spanish Sahara | 10 000 | 12,5 | 60 000 | 75,0 | 10 000 | 12,5 | — | — | — | — | — | — | — | — | 80 000 | 100 |
| St. Helena | 3 000 | 60,0 | 2 000 | 40,0 | — | — | — | — | — | — | — | — | — | — | 5 000 | 100 |
| St. Thomas and Prince Islands | 30 000 | 50,0 | 20 000 | 33,3 | 10 000 | 16,7 | — | — | — | — | — | — | — | — | 60 000 | 100 |
| Sudan | 60 000 | 0,8 | 60 000 | 0,8 | 4 980 000 | 66,0 | 2 350 000 | 31,1 | 90 000 | 4,2 | 10 000 | 0,1 | — | — | 7 550 000 | 100 |
| Swariland | — | — | 5 000 | 2,7 | 50 000 | 26,7 | 100 000 | 53,4 | 32 000 | 17,2 | — | — | — | — | 187 000 | 100 |
| Tanganyika | 400 000 | 6,8 | 150 000 | 2,5 | 250 000 | 4,2 | 790 000 | 13,4 | 3 910 000 | 66,3 | 340 000 | 5,8 | 60 000 | 1,0 | 5 900 000 | 100 |
| Tangier | 80 000 | 66,7 | 35 000 | 29,2 | 5 000 | 4,1 | — | — | — | — | — | — | — | — | 120 000 | 100 |
| Tunisia | 1 730 000 | 54,7 | 400 000 | 12,7 | 570 000 | 18,0 | 450 000 | 14,3 | 10 000 | 0,3 | — | — | — | — | 3 160 000 | 100 |
| Uganda | — | — | — | — | — | — | 420 000 | 8,8 | 4 150 000 | 87,2 | 150 000 | 3,2 | 40 000 | 0,8 | 4 760 000 | 100 |
| Union of South Africa | 1 500 000 | 13,1 | 350 000 | 3,1 | 1 380 000 | 12,1 | 2 040 000 | 17,9 | 3 070 000 | 26,9 | 3 030 000 | 26,5 | 50 000 | 0,4 | 11 420 000 | 100 |
| Zanzibar and Pemba | 240 000 | 80,6 | 25 000 | 9,4 | — | — | — | — | — | — | — | — | — | — | 265 000 | 100 |
| Total | 43 987 000 | 25,0 | 13 092 000 | 7,4 | 42 441 000 | 24,1 | 36 576 000 | 20,8 | 24 290 000 | 13,8 | 12 202 000 | 6,9 | 3 564 000 | 2,0 | 176 148 000 | 100 |

* Despite United Nations official data, this figure has been taken as the correct on the basis of Italian data from the year 1940.

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SUMMARY IN POLISH

PIONOWE ROZMIESZCZENIE LUDNOŚCI NA KULI ZIEMSKIEJ

Celem pracy jest przedstawienie pionowego rozmieszczenia ludności na kuli ziemskiej wg stanu z r. 1945. Zamiarem autora było wykazanie powiązań, istniejących pomiędzy rzeźbą terenu a gęstością ludności.

Wpływ rzeźby na rozmieszczenie ludności jest niewątpliwy, jednakże wpływ ten jest rozmaity w zależności od stopnia rozwoju społecznego, który powoduje zmiany w stanie zaludnienia. Analizę czynników wpływających na kształtowanie się zróżnicowania pionowego rozmieszczenia ludności podjęto tylko w przypadkach typowych.

Podstawą pracy niniejszej była Międzynarodowa Mapa Świata 1:1 mln., francuski [26]* i holenderski [6] atlas kolonialny, oksfordzki szkolny atlas Indii [60] oraz arkusze mapy Azji w skali 1:4 mln. Publikacji w dziedzinie hipsometrii pojedynczych krajów jest niewiele; to też dla 37 krajów zaszła konieczność dokonania pomiarów uzupełniających, przy których przeprowadzaniu współpracowała mgr H. M a s i c k a. Pomiaru te prowadzono metodą następującą: każdy okręg administracyjny poszczególnych państw umieszczono na mapie hipsometrycznej, po czym szacowano liczby mieszkańców na poszczególnych poziomach. Dla wyższych poziomów szacunek oparto na ilości osiedli, zaznaczonych na mapie.

Po omówieniu stanu badań nad hipsometrią lądów i prac, zajmujących się pionowym rozmieszczeniem ludności, autor omówił szczegółowo obecny stan pionowego rozmieszczenia ludności na całej kuli ziemskiej na poszczególnych kontynentach i w około 40 państwach. Na końcu załączono tablice zbiorcze dla kontynentów.

Hipsometria lądów

Pierwsze uwagi na temat pionowego ukształtowania powierzchni ziemi znajdujemy w pracy K l e o m e d e s a pt. „Teoria kół ciał niebieskich” (I lub II w.n.e.). Poglądy jego, jak również późniejsze poglądy Laplace'a [30] nie były jednak poparte rezultatami pomiarów, a ich trafność wiązała się z genialną intuicją naukową obu badaczy. Do ścisłych pomiarów kartograficznych można było przystąpić dopiero w XIX w. w związku z nagromadzeniem materiałów hipsometrycznych, niemniej pierwsze próby dały wyniki albo złe — np. H u m b o l d t a [30], albo jak w przypadku C h a v a n n e'a [13] tylko przypadkowo zgodne z rzeczywistością**.

Przy obliczeniach tych operowano metodą przekrojów, która jednakże nie zdała egzaminu i została zarzucona. Dobre wyniki dały prace bazujące na pomiarach planimetrycznych, prowadzone w latach 80 ub. wieku przez T i l l o w Rosji [89], L a p p a r e n t'a we Francji [39], M u r r a y'a w Anglii [51] czy P e n c k'a i H e i d e r i c h a w Austrii [29]. Dalsze nagromadzenie materiałów, zwłaszcza dotyczących ziem pozaeuropejskich wymagało powtórnego dokonania syntezy, którą podjął K o

* Liczby w nawiasach oznaczają pozycje bibliograficzne wg spisu załączonego na końcu pracy.

** Wykazał to H e i d e r i c h [20].

s i n n a [35], a nieco później O r l i c z [59]. Orlicz posługuje się poziomica 300 m, powszechnie stosowaną w szkole romerowskiej, dlatego jego wyniki są nieporównywalne z innymi.

Z punktu widzenia badań ludnościowych należy podkreślić ważność poziomicy 100 m, ograniczającej rozległe niziny, skupiające znaczne liczby ludności.

Metody obliczania pionowego rozmieszczenia ludności

Jako zagadnienie geograficzne, problem pionowego rozmieszczenia ludności podjęty został dosyć późno, bo w połowie XIX w., przy czym pierwsze prace dotyczyły przede wszystkim terenów górskich, gdzie różnice najbardziej rzucają się w oczy. Badania dotyczyły Tatr [34], Himalajów, Andów i Alp [76]. Równocześnie D e l i t s c h [16] przedstawił pionowe zróżnicowanie gęstości zaludnienia Niemiec Zachodnich. W końcu XIX w. podjęto na szeroką skalę badania nad sezonowym osadnictwem w górach. Poczynając od lat osiemdziesiątych ubiegłego wieku ukazało się wiele prac, dotyczących pionowego rozmieszczenia ludności poszczególnych krajów Niemiec [11, 53], Austrii [85, 19], Czech [15], Serbii [80], Szwajcarii [83, 47], Bułgarii [32], Grecji [84], Włoch [97, 46] a także Stanów Zjednoczonych [8], Boliwii [10] czy Japonii [72].

Wszystkie te prace wychodziły z założeń neomaltuzjańskich, a ich autorom chodziło przede wszystkim o wykazanie względnego przeludnienia na wyższych poziomach hipsometrycznych przy czym w przeludnieniu takim główna rola miała przypadać środowisku geograficznemu. W rzeczywistości zasiedlenie dwu obszarów, nie różniących się zasadniczo pod względem warunków środowiska geograficznego może być i często jest istotnie różne, podczas gdy w różnych warunkach środowiska geograficznego mamy często do czynienia z podobnymi rodzajami osadnictwa, podobną liczebnością i rozmieszczeniem ludności. Czynnikiem decydującym jest bowiem ustrój społeczno-gospodarczy. Na jego rolę zwraca słuszną uwagę U s t i n o w a [90] w pracy o ludności Altaju.

O przegląd pionowego rozmieszczenia ludności całego świata nikt się dotychczas nie pokusił. Z i e r h o f f e r [98] poruszył zagadnienie tylko programowo, S a p p e r [73] szukał górnej granicy osiedlenia różnych ras w Afryce, przy czym powołując się na list G i l l m a n a [21] twierdził, że w Afryce na poziomie powyżej 1000 m, mieszka 63% ludności, podczas gdy w świetle rezultatów pracy niniejszej odsetek ten nie przekracza 29%. Przykład ten może być miarą braku rozeznania w dziedzinie pionowego rozmieszczenia ludności. Praca niniejsza jest pierwszą próbą przedstawienia tego zagadnienia w skali światowej.

Pionowe rozmieszczenie ludności świata

Jak wynika z tablic 1 i 2, podających liczbę ludności, powierzchnię i gęstość zaludnienia poszczególnych poziomów hipsometrycznych (w liczbach i odsetkach) — ponad połowa ludności mieszka na poziomie poniżej 200 m, zajmującym ok. 28% powierzchni łądów.

Zmniejszanie się gęstości zaludnienia w miarę podnoszenia się łądów ilustruje ryc. 1.

Tablice 3—5 wskazują na różnice pomiędzy poszczególnymi kontynentami, jeśli idzie o rolę różnych poziomów hipsometrycznych. Dobrą ilustracją zmian gęstości zaludnienia na różnych poziomach są ryc. 2—6, podczas gdy ryc. 7—12 pokazują liczby ludności na różnych poziomach.

W pionowym rozmieszczeniu ludności poszczególnych kontynentów czy krajów można wyróżnić pewne „poziomy charakterystyczne”, na których skupia się większość

ludności danego kraju. Nie są to poziomy optymalne w sensie determinizmu klimatycznego — w różnych krajach poziomy charakterystyczne zależą od różnych przyczyn, jednakże istnienie ich jest bardzo wyraźne. Zazwyczaj większa gęstość zaludnienia tych poziomów wiąże się z nagromadzeniem większych miast, a zatem zjawisko to jest uwarunkowane stopniem urbanizacji, mało zależnym od środowiska geograficznego.

Wyjaśnienie procesu, który doprowadził do aktualnego pionowego rozmieszczenia ludności przekracza ramy niniejszej pracy, w której zasadniczo ograniczono się do scharakteryzowania obecnego stanu rzeczy.

Wśród państw europejskich omówiono kolejno: P o l s k ę (ludność kraju ogółem — tabl. 6 i miasta położono powyżej 300 m — tabl. 7), N i e m c y (ludność ogółem — tabl. 9, zmiany w pionowym rozmieszczeniu ludności Saksonii w latach 1815—1933 — tabl. 10), B e l g i ę (tabl. 11), F r a n c j ę (ludność ogółem — tabl. 12, miasta liczące ponad 5 tys. mieszkańców — tabl. 13, zmiany w pionowym rozmieszczeniu ludności miejskiej w latach 1792—1926 — tabl. 14), W i e l k ą B r y t a n i ę (tabl. 16), H i s z p a n i ę (tabl. 17), P o r t u g a l i ę (tabl. 18), W ł o c h y (tabl. 19—21 i tabl. 22 w której podano zmiany jakie zaszły w okresie 1881—1936), S z w a j c a r i ę (zmiany w rozmieszczeniu miast w latach 1850—1941 — tabl. 23 i zmiany rozmieszczenia ludności ogółem w latach 1888—1950 — tabl. 24), A u s t r i ę (tabl. 25—27), C z e c h o s ł o w a c j ę (osiedla liczące ponad 2 tysiące w Czechach w roku 1890 — tabl. 28 i ludność ogółem w r. 1945 — tabl. 29), W ę g r y (tabl. 30), R u m u n i ę (tabl. 31—33), B u ł g a r i ę (tabl. 34, 35), J u g o s ł a w i ę (tabl. 36, 37), A l b a n i ę (tabl. 38), G r e c j ę (tabl. 39), F i n l a n d i ę (tabl. 40, 41), N o r w e g i ę (tabl. 42), S z w e c j ę (tabl. 43).

Szczególną uwagę poświęcono pionowemu rozmieszczeniu ludności europejskich obszarów górzystych (tabl. 44, 46—51) wykazując na szeregu przykładów, że w krajach kapitalistycznych uprzemysłowionych zachodzi zjawisko wyludniania się gór (tabl. 15) podczas gdy w krajach, których gospodarka rozwijała się słabiej gęstość zaludnienia w górach nie zmniejszała się (tabl. 8). Porównanie gęstości zaludnienia dwu podobnych rejonów górskich, różniących się gospodarczo (tabl. 45) wskazuje na dominującą rolę czynników społeczno-ekonomicznych wpływających na zaludnienie obszarów górskich. Po krajach europejskich odrębnie omówiony został Z w i ą z e k S o c j a l i s t y c z n y c h R e p u b l i k R a d. Oprócz charakterystyki ludności całego kraju (tabl. 52) i kilku wybranych obszarów (Ukraina — tabl. 53, Gruzja i Armenia tabl. 55, Altaj — tabl. 56 i wykres 13), omówiono zmiany w pionowym rozmieszczeniu ludności miast w latach 1897—1939 (tabl. 54), wskazując na szczególnie silne tempo wzrostu ludności miast, leżących pow. 500 m n.p.m.

Wśród krajów Azji więcej uwagi poświęcono C y p r o w i (tabl. 57), T u r c j i (tabl. 58 i 59), krajom arabskim (tabl. 60 i 61), I r a n o w i (tabl. 63), I n d i o m i P a k i s t a n o w i (tabl. 64 i 65), M o n g o l i i (tabl. 66), C h i n o m (tabl. 67, 68), K o r e i (tabl. 69), C e j l o n o w i (tabl. 71 i 72) oraz J a p o n i i (tabl. 73—75). Osobno zestawiono dane dot. wszystkich wysp Azji (tabl. 70). Na podkreślenie zasługują stosunki japońskie znane lepiej z prac uczonych japońskich [88, 31, 72]. W Japonii rzuca się w oczy kontrast między gęstością zaludnienia nizin i gór. Kontrastu takiego nie spotykamy nigdzie w rolniczych krajach Europy. Na przykładzie Japonii wiadać wyraźnie, że górna granica zamieszkania gór jest granicą ekonomiczną, a nie biologiczną, przynajmniej jeśli chodzi o wysokości, osiągnane przez współczesne osadnictwo.

Z krajów Afryki dokładniejsze dane przytoczono dla A b i s y n i i (tabl. 76), S u d a n u (tabl. 77), N i g e r i i i K a m e r u n u (tabl. 78), K o n g a B e l g i j s k i e g o (tabl. 79), A n g o l i (tabl. 80), Z w i ą z k u P ł d. A f r y k i (tabl. 81—84) i M a d a g a s k a r u (tabl. 85). W południowej Afryce zwraca uwagę

koncentracja ponad miliona mieszkańców w zespole miast, rozciągniętych wzdłuż krawędzi Witwatersrand.

Jeśli chodzi o Amerykę — obfitość materiałów, dotyczących m. in. zmian w okresie 1880—1940 pozwoliła na bardziej szczegółowe omówienie *S t a n ó w Z j e d n o c z o n y c h A m e r y k i* (tabl. 86—89). W *M e k s y k u* (tabl. 90—94) warto zwrócić uwagę na wysokie położenie aglomeracji stołecznej, liczącej ok. 3 mln mieszkańców. To poważne skupienie ludności położone jest na wysokości 2200 m. W *G w a t e m a l i* (tabl. 92) stosunki są typowe dla krajów środkowo-amerykańskich, w których gęstość zaludnienia wyższych poziomów jest większa. Z krajów południowo-amerykańskich więcej stosunkowo miejsca poświęcono jeszcze *K o l u m b i i* (tabl. 94), *E k w a d o r o w i* (tabl. 95), *P e r u* (tabl. 96—98), *B o l i w i i* (tabl. 99), *B r a z y l i i* (tabl. 100) i *A r g e n t y n i e* (tabl. 101—102). Analizę stosunków w Peru i Brazylii przeprowadzono według mniejszych jednostek administracyjnych niż prowincje, a w Peru wzięto pod uwagę rozmieszczenie ludności w roku 1862.

Ostatnim krajem, dla którego podano tablice szczegółowe jest *A u s t r a l i a* (tabl. 103—105). W końcowych tablicach szczegółowych (tabl. 106 i 107) podano spis miast liczących w r. 1950 ponad 100 tys. ludności, leżących na poziomie powyżej 1000 m (43 miast) oraz spis miast, liczących 50—100 tys. mieszkańców, położonych powyżej 2 tys. m n.p.m. (9 miast).

Do pracy załączono na końcu tablice zbiorcze dla poszczególnych kontynentów, w których podano liczbę i odsetek ludności zamieszkałej na różnych poziomach osobno dla wszystkich krajów danego kontynentu. Tablica A zawiera dane dla Europy, tablica C dla Azji, tablica G dla Afryki, tablica D dla Ameryki Północnej i Środkowej, tablica E dla Ameryki Południowej, tablica F dla Australii i Oceanii. Liczby dotyczące Związku Radzieckiego podano w tablicach A i C, a oprócz tego łączne dane dla całego ZSRR zawiera tablica B.

SUMMARY IN RUSSIAN

ВЕРТИКАЛЬНОЕ РАСПРЕДЕЛЕНИЕ НАСЕЛЕНИЯ НА ЗЕМНОМ ШАРЕ

Целью настоящей работы является представление вертикального распределения населения на земном шаре по данным с 1945 г. Автор стремится показать взаимоотношения между избранными высотными уровнями и плотностью населения.

Влияние устройства поверхности на плотность населения не подлежит сомнению, но оно очень различно в зависимости от степени социального развития общества, которая в свою очередь является причиной изменений плотности населения от места к месту.

Анализом факторов влияющих на формирование разниц в вертикальном распределении населения автор занимается только в некоторых определенных и типических случаях.

Базой для работы является Международная Карта Мира 1 : 1 мил., французский [26] * и голландский [6] колониальный атлас, оксфордский школьный атлас Индии [6], а для восточной Азии автор пользовался тоже картой в масштабе 1 : 4 мил. В основном учитывались опубликованные материалы, но во многих случаях [37 стран] оказалось необходимым проделать собственные измерения; в этой работе сотрудником автора была магистр Г. М а с и ц к а. Измерения эти проделаны были следующим методом: каждый административный район каждого государства был обозначен на гипсометрической карте, затем проводился подсчет числа жителей на отдельных уровнях. Для более высоких уровней подсчет производился на основании числа обозначенных на карте поселков

Затем выяснено в каком состоянии находятся исследования по гипсометрии суши и работы по вертикальному распределению населения и дан подробный анализ современного вертикального распределения населения на всем земном шаре на отдельных континентах и особенно во всех государствах.

Г и п с о м е т р и я к о н т и н е н т о в

Первые заметки о вертикальном расчленении земной поверхности мы находим в работе Клеомедеса под греческим заглавием „Теория кругов тел небесных“ (I или II в. н. э.). Но его взгляды также как и более поздние взгляды Лапласа [30] не были подкреплены результатами измерений. Меткость этих взглядов является следствием гениальной научной интуиции обоих исследователей.

Точные картографические измерения можно было начать лишь только в XIX в. благодаря накоплению гипсометрических материалов. Однако результаты первых попыток были вовсе плохие, например измерения Гумбольдта [30] или, как это видно в случае Шаваннеса [13] только случайно сходные с действительной величиной**.

При подсчетах Гумбольдта применен был метод разрезов, но после того как он оказался непригодным его перестали употреблять. Точные результаты дали работы базирующие на планиметрических измерениях, которые проводил в 80 годах прошлого столетия Тилло в России [89], Лапрант во Франции [39], Мюррей в Англии [51] или же Пенк и Гейдерих в Австрии [29]. Дальнейшее собрание материалов, особенно относящихся к неевропейским территориям требовало вторичного синтеза. Составил его Косинна [35], и немного позже Орлич [59]. Орлич употреблял изогипсу 300 м., везде применяемую в картографической школе Е. Ромэра, потому результаты его работ для низких уровней нельзя сравнивать с теми работами, которые применяют изогипсу 200 м.

* Числа в скобках обозначают библиографические позиции по списку приложенном в конце работы.

** Это показал Гейдерих [20].

С точки зрения исследования населения следует подчеркнуть важность изогипсы 100 м., которая является границей обширных низменностей, сосредоточивающих значительное количество населения.

Методы подсчета вертикального распределения населения

Проблемой вертикального распределения населения с географической точки зрения начали заниматься довольно поздно, приблизительно в половине XIX в., при чем в первых работах занимались в первую очередь горными областями, где различия плотности населения больше всего бросаются в глаза. Исследования проводились на территории Татр [34], Гималаев, Андов и Альп [76]. В то же время Делич [16] представил различия в вертикальном распределении плотности населения в западной Германии. Зачатки широкого круга работ по исследованию сезонного странствования в горных областях относятся к концу XIX века. С восьмидесятых годов прошлого столетия появились многие работы по вертикальному распределению населения в отдельных областях и странах: в Германии [11, 53], Австрии [85, 19], Чехии [15], Сербии [80], Швейцарии [83, 47], Болгарии [32], Греции [84], Италии [97, 46] а также Соединенных Штатов Сев. Америки [8], Боливии [10] и Японии [72].

Все эти работы принимали за исходную точку неомальтузианские положения, а их авторы стремились прежде всего показать, что на более высоких гипсометрических уровнях существует относительно перенаселение при чем в таком перенаселении главная роль должна была принадлежать географической среде. В действительности заселение каких нибудь двух областей, которые не разнятся существенно друг от друга по отношению условий географической среды, может быть и часто бывает в самом деле разное, тогда как в различных условиях географической среды можно часто обнаружить сходные типы поселенчества, подобное число и сходное распределение населения. Происходит это оттого, что решающим фактором является социально-экономическая структура общества.

На ее значение правильно обращает внимание Устинова [90] в своей работе о населении Алтая.

До настоящего времени никто не пробовал дать обзор вертикального распределения населения всего мира. Циргоффер [98] подошел к этой проблеме с точки зрения программы, Саппер [73] интересовался верхней границей поселения различных рас в Африке, при чем утверждал, ссылаясь на письмо Гиллмана [21], что в Африке выше уровня 1000 м. живет 63% населения, тогда как настоящая работа показала, что этот процент не больше 29%.

Этот пример является довольно точным доказательством того, как мало было у нас научных сведений относительно вертикального распределения населения. Настоящая работа представляет первую попытку показать этот вопрос во всемирном масштабе.

Вертикальное распределение населения мира

Анализ первой и второй таблицы, на которых представлено число жителей, площадь и плотность населения для отдельных гипсометрических уровней (в абсолютных числах и процентах) позволяет обнаружить, что более половины жителей обитает на уровне расположенном ниже 200 м. Этот уровень занимает около 28% площади всей суши.

На рис. 1 показано, что плотность населения уменьшается вместе с увеличением высоты суши над уровнем моря. На таблицах 3—5 показаны различия плотности населения на отдельных континентах в зависимости от абсолютной высоты. Хорошие иллюстрации к проблеме разниц плотности населения на разных уровнях представляют рис. 2—6, тогда как на рис. 7—12 показано число жителей на разных уровнях.

По отношению к вертикальному распределению населения на отдельных континентах или в отдельных странах можно выделить „характерные уровни“, на которых сосредоточивается большинство населения данной страны. Эти уровни не являются оптимальным в смысле климатического детерминизма — в разных странах характерные уровни зависят от различных причин, но они всегда являются очень резко выраженными. В некоторых случаях повышенная плотность населения этих уровней связана со скоплением

крупных городов следовательно это явление обусловлено степенью урбанизации, которая в малой степени зависит от географической среды.

Объяснение исторического процесса, который обусловил современный облик вертикального распределения населения не является целью настоящей работы. Ее цель — дать характеристику современного распределения плотности населения в зависимости от высоты над уровнем моря.

Из европейских государств дан анализ и учтены Польша (население страны вообще табл. 6 и города расположенные выше 300 м. н. у. м. табл. 7), Германии (население вообще — табл. 9, изменения в вертикальном распределении населения в Саксонии — в 1815 — 1933 годах — табл. 10), Бельгия (табл. 11), Франция (население вообще — табл. 12, города у которых больше 5 мил. жителей — табл. 13, изменения в вертикальном распределении городского населения в 1729—1926 г. — табл. 14), Великая Британия (табл. 16), Испания (табл. 17), Португалия (табл. 18), Италия (табл. 19—21 и табл. 22, на которой представлены изменения за период с 1881 — 1936), Швейцария (изменения в распределении городов в 1850 — 1941 годах — табл. 23 и изменения в распределении населения вообще в 1888 — 1950 годах — табл. 24), Австрия (табл. 25 — 27) Чехословакия (поселения в которых больше 2000 жителей в Чехии в 1890 году — табл. 28 и население вообще в 1945 г. — табл. 29), Венгрия (табл. 30), Румыния (табл. 31 — 33), Болгария (табл. 34, 35), Югославия (табл. 36, 37), Албания (табл. 38), Греция (табл. 39), Финляндия (табл. 40, 41), Норвегия (табл. 42), Швеция (табл. 43).

Особое внимание уделено вертикальному распределению населения в европейских горных областях (табл. 44, 46 — 51), где показано на целом ряде примеров, что в индустриализированных капиталистических странах происходит процесс опустошения горных областей, в то время как в странах отсталых в хозяйственном отношении плотность населения в горных областях не уменьшалась (табл. 8). Сравнение плотности населения двух сходных горных областей по своей природе, но которые разнятся в хозяйственном отношении (табл. 45) показывает доминирующую роль социально-экономических факторов влияющих на заселение горных областей.

Отдельно обсужден СССР. Дана характеристика населения всей страны (табл. 52) и нескольких избранных областей (Украина — табл. 53, Армения — табл. 55, Алтай — табл. 56 и график 13), обсуждены изменения в вертикальном распределении городского населения в 1897 — 1939 годах (табл. 54), обращено внимание на особенно сильный темп роста городского населения, в городах расположенных выше 500 м. н. у. м.

В Азии много внимания посвящено Кипру (табл. 57), Турции (табл. 58, 59), арабским странам (табл. 60 и 61) Ирану (табл. 63), Индии и Пакистану (табл. 64, 65), Монголии (табл. 66), Китаю (табл. 67, 68), Корее (табл. 69), Цейлону (табл. 71, 72) и Японии (табл. 73 — 75). Отдельно сопоставлены данные касающиеся всех островов Азии (табл. 70). Следует подчеркнуть, что проблема вертикального распределения населения Японии представляет большой интерес; лучшими источниками по этому вопросу являются работы японских ученых (88, 31, 72). В Японии бросается в глаза контраст между плотностью населения низменных и горных областей. Такого контраста мы не встречаем нигде в европейских аграрных странах.

На примере Японии ясно видно что верхняя граница обитаемой зоны в горных областях является экономической границей, а не биологической, по крайней мере относительно той высоты над уровнем моря, до которой доходит современное распределение населения.

В Африке более точные данные приведены для Эфиопии (табл. 76), Судана (табл. 77), Нигерии и Камеруна (табл. 79), Анголы (табл. 80), Союза Южной Африки (табл. 81 — 84) и для Мадагаскара (табл. 85). В южной Африке обращает на себя внимание концентрация более одного миллиона жителей в комплексе городов, вытянутых вдоль золотоносного уступа Витватерштранд.

Относительно Соединенных Штатов Сев. Америк. — обильные материалы имеются между прочим относительно перемен происшедших в период с 1880 — 1940 г. Это дало возможность провести анализ для всего этого периода (табл. 86 — 89). В Мексике (табл. 90 — 98) следует обратить внимание на высоко н. у. м. расположенную столичную аггломерацию, представленную 3 миллионами жителей. Это громадное скопление жителей расположено на высоте 2200 м. н. у. м. В Гватемале и (табл. 92) местные условия являются такими каковы типичны для стран центральной Америки — здесь плотность населения увеличивается с увеличением высоты н. у. м.

В Южной Америке относительно много места отведено Колумбии (табл. 94), Эквадору (табл. 95), Перу (табл. 96 — 98), Боливии (табл. 99), Бразилии (табл. 100) и Аргентине (табл. 101 — 102). Анализ вертикального распределения населения в Перу и Бразилии базируется не на статистических данных по провинциям, а на данных по департаментам и уездам.

Последней страной, для которой приведены подробные таблицы является Австралия (табл. 103 — 105). В последних таблицах с подробными данными (табл. 106 и 107) дан список городов (в которых число жителей в 1950 году было больше чем 100 тысяч) расположенных выше 1000 м. н.у.м. (40 городов), и список городов, (в которых более 50 тысяч жителей), расположенных выше 2000 м. н.у.м. (9 городов).

В конце работы приложены сводные таблицы для отдельных континентов и для всех государств земного шара с учетом шести гипсометрических уровней.

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GENERAL TABLES

Vertical distribution of population:

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| B — Soviet Union | E — South America |
| C — Asia | F — Australia and Oceania |
| G — Africa annexed | |

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