mentioned breed of cattle. The coast cattle are smaller. The live weight is from 450 to 550 lb. They are not very typical either with reference to shape or colour but are peculiar in their ability to subsist upon scanty pasturage.

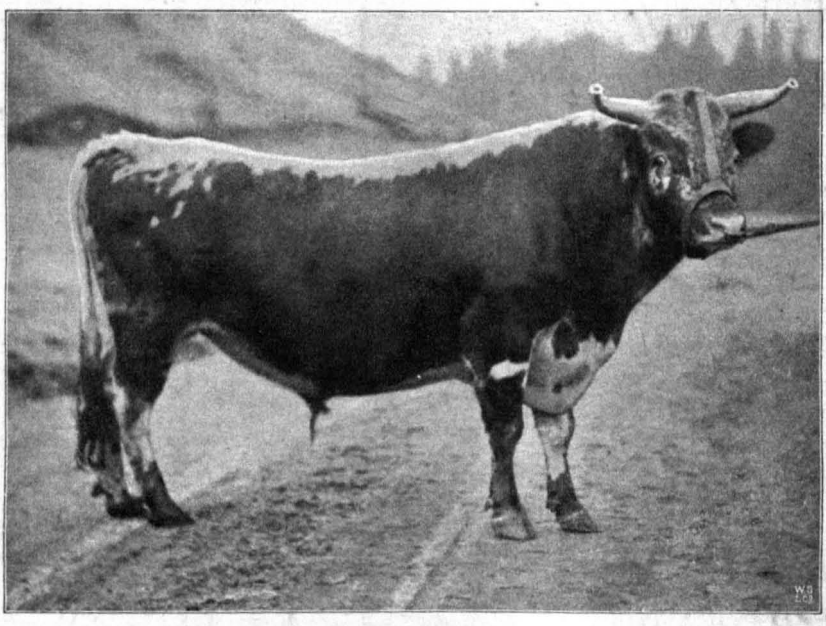
The Norwegian *sheep* are also, upon the whole, small and slender. The live weight on an average hardly reaches 90 lb. for adult animals. The rams have small and slightly spiral

Telemarken cow.

horns, a short neck and fine wool. The colour may be black, white or mottled. During the last few decades, the Norwegian sheep has been very much crossed with foreign breeds, especially Scotch Cheviots, black-faced, English Oxfordshire, and during earlier times also with Spanish merino. Of these theCheviot gains an ever-increasing popularity in the real sheep districts.

Although the *reindeer* cannot strictly speaking be called a domestic animal, it is kept in a domesticated condition by the Lapps. The reindeer belongs to the cervine genus and has long branched horns which are shed annually, but grow out again. It is a little

more than a yard in height and has a live weight of about 260 lb. Its chief food is the reindeer moss which, during the winter time, it scrapes out from under the snow with its broad strong hoofs. It provides the Lapps with meat, milk, skin, etc., and the largest bucks are also used as draught-cattle during their constant wanderings. The Lapps roam on the highest mountains above the tree limit, and it is only during the winter that they come down every now and then into the lower districts, where



Telemarken ox.

the reindeer herds do much damage to the forests. The Lapp family that is to live on its herd of reindeer must have at least two to three hundred head; and many have a thousand or more. To guard their animals the Lapps use their well-trained dogs which are of the same breed as the Eskimo dog. At the latest census there were altogether 170,000 reindeer in the country, but the number is now increasing, as several of the peasantry have also commenced to keep reindeer herds on the mountain pastures.

In connection with the cattle-raising industry, we must say a few words about the dairy industry. Thirty or forty years ago

Herd of reindeer.

Norwegian sæter. Picture by Fr. Borgen.

almost all the butter and cheese produced in this country was made on the individual farms, but about that time the farmers commenced to establish co-operative dairies carried on according to the so-called cold-water system by which better and more uniform products were obtained. These co-operative dairies now exist in about one half of the parishes of the country to the number of 650; and it is estimated that they deal with somewhat more than 220,000 gallons of milk daily. Most of them are provided with separators and an entirely up to date equipment; and the yield is partly sold in the English market at the highest prices there obtainable. Cheese dairies exist in a smaller number around the Kristiania Fjord and the Trondhjem Fjord, but they have not as yet succeeded in producing a cheese which satisfies the requirements of foreign markets. At Hamar, Kap on Toten and at Sannesund there are large milk-condensing factories, of which the production goes almost entirely to foreign markets.

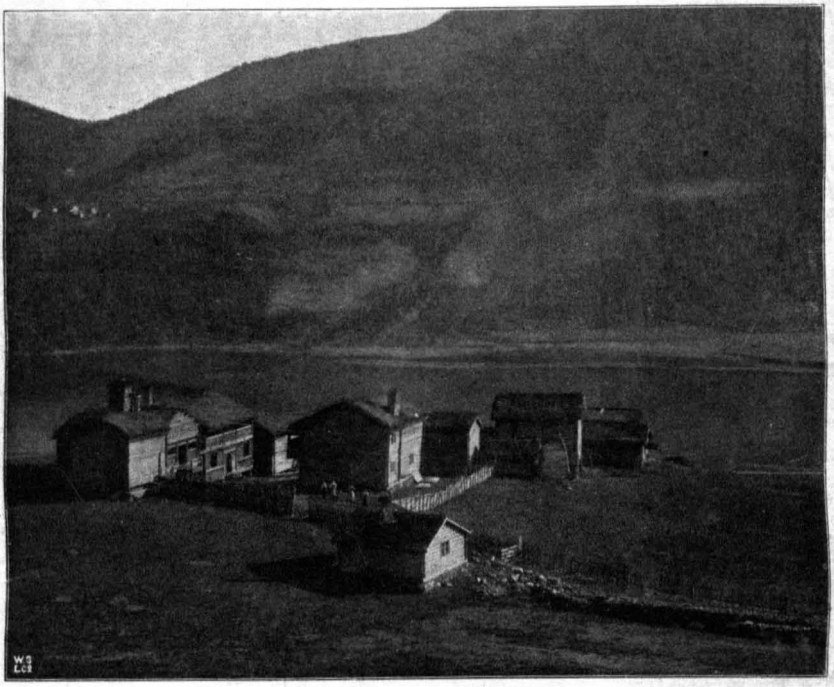
Many of the farmers in the valleys and on the plains are owners of portions of the more or less barren mountain plateaus where during the summer good grazing may be found.

Here we find the *Sæter* or mountain outfarms which are characteristic annexes of many of the Norwegian farms.

When the spring field-work at home has been finished and vegetation in the mountains has progressed so far that the animals can find the necessary food, the dairy-maid, and in certain districts the farmer with his whole household, goes with the cattle to the outfarm. The latter may be 10, 30 or even 50 miles distant, and sometimes it requires several days to reach this destination through trackless regions. The houses are as a rule small and low; one for the domestic animals, another serving as dwelling for the family, and also containing the dairy, and finally, one or more small hay-lofts. In the immediate neighbourhood of the houses, a piece of the ground has been cleared and fenced in, and here the manure gathered in the course of the summer is spread. A fine and nourishing grass grows here which is mown, and in the course of the winter brought home to the farm. During the two or three months the cattle stay at the outfarm, butter and cheese are produced. About the first of September, when the cold nights commence to make themselves felt in the mountains, the dairy-

maid with the herd and the product of the sæter returns to the home farm.

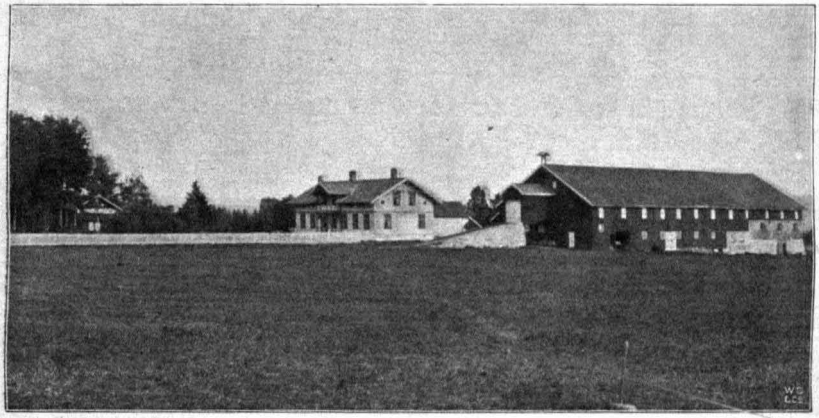
The gross return of the live stock industry is generally estimated at a value of about 140,000,000 kroner which, added to the before-mentioned 70,000,000 kroner, being the yield of agriculture, gives an aggregate gross income from Norwegian husbandry of rather more than 200,000,000 kroner.



Ancient farm.

The erection of the buildings on Norwegian farms is relatively expensive on account of the severity of the winter. All kinds of domestic animals must have good warm houses, and we cannot, like farmers of more southern countries, stack our hay and grain, or keep our root-crops out in the field during the winter. We must have houses for everything. In former days it was very common to build a multitude of small houses, each fitted for its own special use, clustering round the court-yard; while of late it has become the rule to limit the number of houses on a common farm to four. The main building is the dwelling-house,

its size and the number of its rooms being generally regulated by the needs of the farm, and the larger or smaller requirements of the owner. As a rule there is under the whole house a cellar for storage of the root crops needed for the household, as well as for other stores. The main building also contains a kitchen, a pantry, one or more parlours and sleeping-rooms and guests' rooms. It is always built of logs, generally wainscoted on the inside, and built in one or two stories, according to the size of the farm and the custom of the district. Near the main building, but separated from it, there is, as a rule, another building containing the laundry, room for the hired help, and also accommo-



Modern farm.

dation for the winter store of fuel. The out-building, properly so-called, gives accommodation for the animals, of which each kind has its separate compartment, and also for hay, grain, threshing implements, etc. The manure is well housed either in the cellar below, or sheds open at the sides so that, in our wet climate, it may not lose its strength from exposure to the weather. In more modern out-buildings there is, as a rule, at a certain distance from the floor, often quite up under the gable, a waggon bridge running through the whole length of the building. The hay as well as the unthreshed grain is driven in here and easily removed from the waggons into the barn below, where it can thus be well packed, and requires little space. The out-building, like the other edifices, is built of wood, except the walls of the stable which are sometimes made of stone or brick. The so-called

«stabbur», or store-house on posts, is a typical Norwegian building, and is destined for the storage of such provisions as can be preserved, e.g. grain, flour, cured pork, meat, herring and other fish, «fladbrød» (a sort of bannocks), butter, cheese, etc., and in some parts of the country also such clothing and bedding as is

Stabbur.

not in daily use. The stabbur is as a rule divided into two stories, of which the top one is used for grain, and the lower one for other food products. In order to prevent vermin from entering the house it is built upon massive posts at a height of 1 or $1^1/_2$ yards above the ground. In several of the mountain valleys there is a gallery of more or less artistic design before the front door of the stabbur. On many farms, especially

in the more thinly populated districts, there is a smithy, sometimes in connection with a carpenter's shop. On account of the small size of the farms and their often isolated situation, the artisan's work is here, to a much greater extent than in southern countries, performed on the farm itself; and a Norwegian farmer will, as a rule, be able personally to make many of the repairs of different kinds that are needed. As an average for the whole country, it is estimated that the cost of the buildings is about 30 % of the value of the estate, including also that part of the value which consists of forestry, fishery, etc.

The price of farms in Norway has been increasing, even at times when husbandry has been depressed by the low prices its products fetch, the high wages, taxes, etc. As the standard of valuation for the properties, we use the sale-price according to skyldmark (standard of assessment). It was during

the years	1866	to	1870	. . .	kr.	1,158
» »	1871	»	1875	. . . .	»	1,309
» »	1876	»	1880	. . . .	»	1,491
» »	1881	»	1885	. . . .	»	1,588
» »	1886	»	1890	. . . .	»	1,610
» »	1891	»	1895	. . . .	»	1,700

In 1896 it was kr. 1676 and in 1897, kr. 1695. While the price of land in most European countries has been decreasing, in Norway, as will be seen from the above table, it has been maintained or has increased. The causes of this are probably several. Here the farms, on the whole, are small, and the fall in prices of landed property has chiefly affected the larger estates; moreover Norwegian husbandry, probably to a larger extent than in most other countries, is combined with other means of livelihood, such as forestry and fishing; and when times have been favourable for the latter, this has also benefited husbandry. Finally, times on the whole, during the latter part of the period spoken of above, have been good in the country, as far as money is concerned, and this, as a matter of course, has reacted on the prices of property.

In the course of the last twenty or thirty years the state has by several measures tried to benefit agriculture. Such measures are under the supervision of a managing director working under the Department of Agriculture. Public grants for the advancement of husbandry may be divided into the following

five chief items: the agricultural budget properly so called, the Agricultural College, veterinary matters, the allotment authorities and the Royal Society for Norway's Welfare.

The *agricultural budget* is balanced with an expense of 800,000 kroner, including the salaries of a staff of state functionaries, grants in favour of agricultural, dairy, and horticultural schools, laboratories of different kinds, contributions to the agricultural societies of the counties, etc.

The *Agricultural College*, since its establishment in 1859, has been connected with the model farm at Aas near Kristiania. Up to the year 1897, advanced instruction was here given only to agriculturists, but in the above-mentioned year the school was enlarged so as to become also a college for gardeners, dairy farmers, surveyors and foresters. The Agricultural College is managed by a director, and the staff of teachers consists of nine professors and ten instructors and assistants. The annual state contribution on the ordinary budget amounts to about 100,000 kroner.

Civil *veterinary matters* are also managed by a director who is at the same time the manager of the veterinario-pathological laboratory of the state. The state and county veterinarians are under his guidance, as also the public tuberculin examinations, the courses of instruction for veterinarians, quarantine stations, etc. Norway has not as yet a separate veterinary college, but the establishment of such an institution is under discussion. The annual government grant to veterinary institutions amounts to about 130,000 kroner.

For the advancement of the *public allotment* there have been appointed 44 chief surveyors with a staff of assistants. The whole salary and travelling expenses of the staff are paid by the state, and thus the expenses for the interested lot-owners become relatively small. As it is often necessary, as a consequence of an allotment, to remove houses, there is on the annual allotment budget a standing grant of 50,000 kroner, for the purpose of rendering assistance to needy lot-owners; while the total amount of the budget is 250,000 kroner.

The Royal Society for Norway's Welfare is the central agricultural society of the country, while all the county agricultural societies are its subordinate branches under whose direction the parish or district societies in their turn are working. The purpose

of the society is to advance agriculture and kindred pursuits, and to defray the expenses connected therewith, it has the interest of its capital, which at present amounts to about 270,000 kroner, membership subscriptions to about 3000 kroner, and an annual government grant of from 30,000 to 40,000 kroner. The society, among other things, furthers its object by publishing a monthly periodical.

Furthermore, there are certain minor public funds intended for the advancement of agriculture. Among these we may mention the *fund for buying land*, amounting to 500,000 kroner, out of which loans are granted to the municipalities for the purpose of buying large estates to be assigned to people without means, at the purchase price, in plots of not more than 12 acres of tillable soil; and for the purpose of being granted as loans on the security of parcels of the same size, which people without means intend to acquire as freehold property. The interest paid on these loans, which may not be made to any single community to a larger amount than kr. 25,000, is $3^3/_4$ %, which percentage, in the case of loans granted to purchasers of the parcels, may be raised to 4 %. The time of payment is up to 25 years.

Out of the *cultivation fund*, which amounts to kr. 1,000,000, loans are granted for the purpose of cultivating and draining soil, at an annual interest of $2^1/_2$ %, and the time of repayment is up to 20 years, including five years in which no instalments are required. These loans are granted either on the security of mortgages, or on the guarantée of the municipality.

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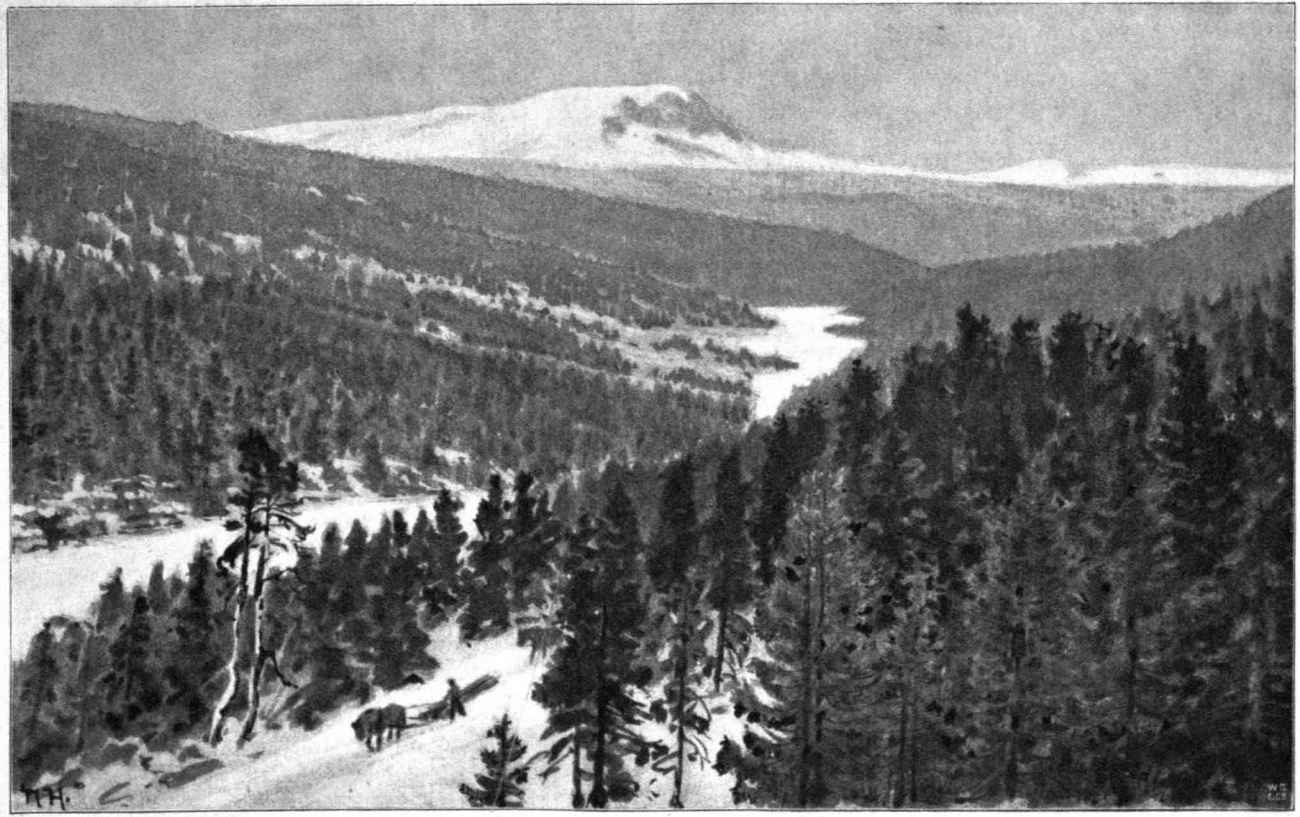
FORESTRY

Of the total area of the country, which is 124,495 sq. miles, about 3 % are represented by towns, grain-fields and meadow-land, while about 76 % are represented by outfields, grazing land, bogs, bare rock, snow fields and glaciers; the remainder, 21 % or 26,324 (or with the towns 26,340) sq. miles, is considered to be covered by forests.

In southern Norway there are a few scattered and very small forests, consisting of deciduous trees of those species which cannot well withstand the influence of cold, such as beech *(Fagus sylvatica)*, oak (especially *Quercus pedunculata)*, and elm *(Ulmus montana)*, but these are of little importance for the sylviculture of the country. The beech occurs wild as far north as the 61st degree of latitude, but it only forms forest around the town of Larvik and in a few other places. It attains a height of somewhat more than 80 feet. The oak is found wild as far north as the 61st degree, in the interior of the country, near Lakes Mjøsen and Randsfjord, and up to the 63rd degree on the coast. It may reach a height of between 100 and 130 feet, and now forms a few scattered smaller forests on the southern and eastern coasts; but in former days it occurred much more extensively. The elm grows all over the country up to the polar circle, but only in one single place there is a small elm forest. It may attain a height of somewhat more than 100 feet. The real forest trees of the country are the Scotch fir *(Pinus silvestris;* in Norwegian called «furu»), spruce *(Picea excelsa;* in Norwegian called «gran») and birch *(Betula verrucosa* and *odorata)*. With the exception of the spruce which, apart form a single valley, Saltdalen, hardly forms



Norwegian forest. Sketch by N. Hansteen.

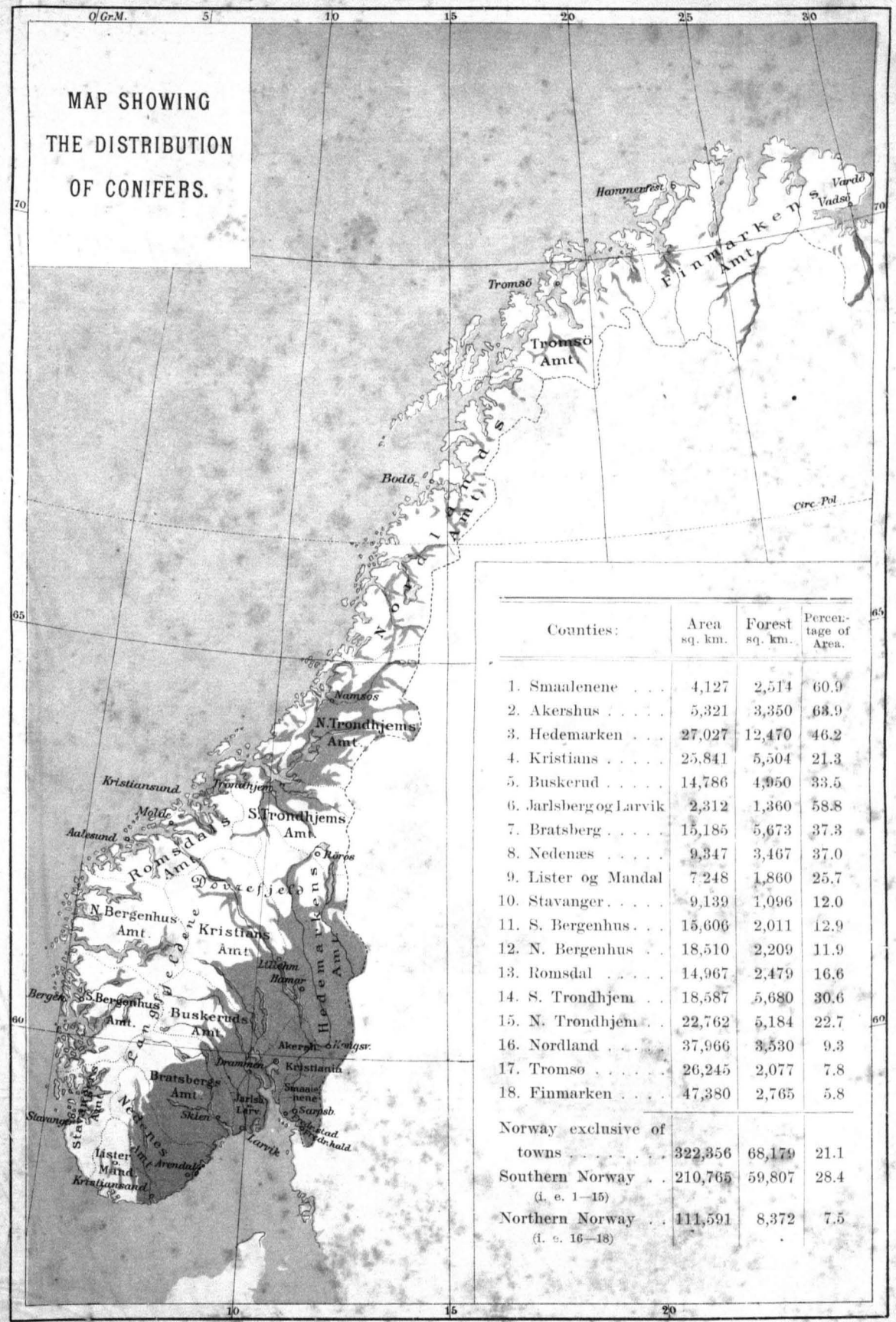
forests north of the polar circle, these trees grow all over the country, sometimes in an unmixed continuous forest, covering large stretches, but more commonly mixed with each other, or with sporadic representatives of other species of trees. If we were to make a comparison with the forest growth of the other countries of northern Europe, there would, as a general rule, be little more to be said about the Norwegian forests than may be said about all plants which attain full development in this country, and are acclimatised. It has been observed that the same species of trees here produce mature seed at an earlier age than in more southern countries, and that this seed which, at least as far as concerns the pine and spruce, is of smaller size and less weight than foreign seed, and constantly decreases the farther north it is produced, yields a more hardy plant. Our forests may be considered, on the whole, as more capable of reproduction and more easily grown than might be expected in a mountainous country within the polar circle; and the trees reach a certain degree of development, and are able to form forests farther north than probably anywhere else in the world. As far as growth and general condition are concerned, our forests present a highly varied picture. Besides the soil, which varies greatly in quality in this ice-ground country, there are a number of other circumstances which, each in their own way, influence the forests. In the article entitled «Plant-Life», these conditions have been stated at length for the whole vegetation of the country, and in the same article information is given about the occurrence, limit of growth, etc., of the forest trees. As a forest country, Norway naturally falls into three parts — the country north of the polar circle, the western coast region, and the inland region south of the polar circle. The inland forests differ again in several respects, — for instance, with reference to the height above the sea-level at which the limit of vegetation occurs, and the more or less frequent occurrence of the spruce as a forest tree, or, according to whether they are situated in the northern or south-eastern part of the country.

North of the polar circle, the birch is predominant, on the coast as well as in the interior, and forms the great bulk of the forests. Of spruce some scattered and lonely individuals appear as far north as 69° 30′ N. Lat., while the pine forms quite considerable forests, the most northern forests in existence, as far

north as the 70th degree of lat. The country within the polar circle which has an area of 36,081 sq. miles, has 2265 sq. miles, that is to say somewhat more than 6%, of forest, and less than 1/2 % of fields and meadows. Vast tracts of this region — the country of the midnight sun, properly so called — are entirely desolate, only traversed every now and then by the nomadic Lapps, with their reindeer flocks. The mountain plateau of Finmarken, and to a certain extent also the islands, have for a long time been almost devoid of forests. But as late as the beginning of the 18th century, when the settlement of these regions first commenced in earnest, dense forests (birch and in part pine) were found in several places in the open, evenly-sloping valleys, and at the heads of the large fjords.

South of Saltdalen (about 67 degrees N. Lat.) and outside the polar circle, the forest changes character. The coniferous trees become more prominent, and form the forest-covering of the wooded plains and the lower hills down to the very southernmost part of the country. (See the chart of conifers with a tabular statement of the coniferous and deciduous trees of the country, according to Prof. HELLAND). In the eastern and southern parts of the country, these trees cover the mountain slopes, up from the cultivated fields and the home pasturages at the bottom of the valleys, and are replaced, at a height of 2600 feet above the level of the sea, by birch forests, which in their turn disappear at the height of 3200 to 3600 feet above the level of the sea yielding their place to the shrubs of the mountain plateau, the dwarf birch *(Betula nana)* and willow *(Salix)*.

The coastland may be considered almost as devoid of forests, from the southern point of the country to the Russian frontier on the Arctic Ocean. A great part of the country west of the Dovrefjeld and the Langfjeldene is taken up by this coast, which retains its barren and naked aspect far into the many deep-cut fjords. It is true, in islands and on promontories where protection is afforded from the sea-winds, some small forests may still occur, which reckless treatment has not yet been able to destroy; but the bulk of the forest is found, as is also shown by the chart, farther in in the interior of the country, at the heads of the fjords and in the valleys which form their continuations, and on those wide isthmuses where the climate approaches a continental one. The western part of the country, however, is poorly provided with



Counties:	Area sq. km.	Forest sq. km.	Percentage of Area.
1. Smaalenene . . .	4,127	2,514	60.9
2. Akershus	5,321	3,350	63.9
3. Hedemarken . . .	27,027	12,470	46.2
4. Kristians	25,841	5,504	21.3
5. Buskerud	14,786	4,950	33.5
6. Jarlsberg og Larvik	2,312	1,360	58.8
7. Bratsberg	15,185	5,673	37.3
8. Nedenæs	9,347	3,467	37.0
9. Lister og Mandal	7,248	1,860	25.7
10. Stavanger	9,139	1,096	12.0
11. S. Bergenhus . . .	15,606	2,011	12.9
12. N. Bergenhus . .	18,510	2,209	11.9
13. Romsdal	14,967	2,479	16.6
14. S. Trondhjem . .	18,587	5,680	30.6
15. N. Trondhjem . .	22,762	5,184	22.7
16. Nordland	37,966	3,530	9.3
17. Tromsø	26,245	2,077	7.8
18. Finmarken . . .	47,380	2,765	5.8
Norway exclusive of towns	322,356	68,179	21.1
Southern Norway . . (i. e. 1—15)	210,765	59,807	28.4
Northern Norway . . (i. e. 16—18)	111,591	8,372	7.5

Petersen & Waitz, Lit. Anst. Kristia.

forests in comparison with the inland district lying outside the polar circle, and especially that part of the country lying south and east of the mountains. If we consider the county of Romsdal, the two Bergenhus counties, Stavanger county and the districts of Lister, as belonging to the western part of the country, then we find that out of the area of the West Country, which is 24,072 sq. miles, only 3,233 sq. miles, or 13 %, are covered by woods. That part of Norway which lies south and east of the mountains, and has an area of 41,322 miles, has 15,659 sq. miles, that is to say, about 38 %, of forest. The forest trees of the west of the country are pine and birch; the spruce is very rarely found wild, as a rule only as scattered individual trees; and it hardly forms forests outside the inland district of Voss situated about 40 miles east of Bergen.

The tabular statement shows that the forests of the country are of extremely uneven distribution. A glance at the forest chart will furthermore show that this distribution has been greatly dependent upon the geographical situation of the districts, whether within or without the polar circle, inland or on the coast. Some regions have copious forests, others are entirely devoid of them. If a fairly correct picture of the forests of the country be desired on the basis of the forest chart, it must be remembered that as far as the inland region is concerned, the birch often occurs as a forest tree, both in the outfields of the farms, below the conifer forests, and in the belt above, up to 650 feet higher than the latter, and also that it is the most important forest tree in the northern part of the country, and in large parts of the coast country. Of Finmarken, which is the northernmost, and at the same time the largest, county in the country, 5.8 % is covered by forests; among the southern counties, the inland county of Akershus has 63.9 %, while the coast county of Nordre Bergenhus has only 11.9 % of forest. The inland county of Hedemarken has the largest forest area, this being 4813 sq. miles or 46.2 % of the total area of the county, while the coast county of Stavanger has the smallest forest area, namely, 423 sq. miles, or 12.0 %. It is calculated that about one fourth of the districts of the country have a surplus of forest, one fourth have sufficient for their own use, and the remaining two fourths are obliged to buy. About three fourths of the districts, however, have sufficient to provide their own fuel. Prof. Helland has given very valuable

information about the extension, nature, production, etc. of the forests, both in the various districts of the country, and in the tributary districts of the various rivers. These matters, which, on account of the lack of uniformity in the nature of the country, present peculiar difficulties in their study, cannot here be treated in detail; moreover, the forest statistics, on several points, are still rather a neglected subject in this country, inasmuch as it is necessary to a large extent to build upon approximate estimates, no detailed information being available.

Both the annual production and the new growth vary greatly. The production is estimated at 344,000,000 cub. feet for the whole country, or 203 cub. feet per acre forest. Of this quantity, about one fifth is exported, the rest consumed in the country. With a population of about 2,000,000 there is an annual average consumption for each individual in the country of 137 cub. feet, and a forest area of 8.42 acres. In the fifteen southern counties (see the chart, nos. 1—15), the new growth varies from 22.8 cub. feet per acre in the south-east of Norway, to 18.2 cub. feet in the West Country and in southern Trondhjem county, and 11.4 cub. feet in northern Trondhjem, and for the whole fifteen counties it amounts on an average to 20.7 cub. feet per acre of forest. But, at the same time, the cutting down of the forests, in these same counties, is estimated at 21.7 cub. feet to each acre of forest. In the three northernmost counties also (chart, nos. 16—18), the cutting down goes on somewhat faster than the growth. The result is that on an average for the whole country the forests are made to yield more than their annual new growth.

Nor has the ratio in which our most important forest trees occur been very thoroughly examined into. It is presumed that about three fourths of the forest area of the country is covered with conifers, and one fourth with foliage trees. The pine, the original coniferous tree of the country, may still be considered as very prominent in the great forests in the southern parts of the country, and on the slopes of the Dovrefjeld. But from this point (about 62° N. L.) to the polar circle and in the south-eastern part of the country the bulk of the forests consists of spruce which has immigrated later across the low mountains forming the frontier towards the east, and now forms extensive forests out to the very coast line. The limit of the pine, as a rule, is about 330 feet

higher than that of the spruce; but in some places it has been observed that the spruce grows up to the same height above sea-level as the pine and in the districts near the Swedish frontier even higher.

As already stated, the time required by the conifers to reach timber size varies greatly in this country, where climatic and other conditions vary so very much on account of the great distances and the ruggedness of the country. In Southern Norway the pine, when from 75 to 100 years old, is as a rule sufficiently large to yield timber of from 23 to 25 feet in length and 9 or 10 inches in diameter at the top. The spruce can, under favourable conditions of growth, yield timber of the same size somewhat earlier, and may be ripe for cutting down at an age of 70 or 80 years. But for the whole country, the period of growth for trees ripe for felling, may be placed somewhat higher, namely, for the pine at about 150 years, and for the spruce at 120—150 years. In the mountains and in the northern part of the country, the period of growth may be extended to 200 years and more. The height rarely exceeds 100 feet, and it decreases towards the coast and northwards, in such a manner, however, that in the northernmost pine forests of the country, in the 70th degree of latitude, the height of the trees may still be 60 or 65 feet. Seeding years, as a rule, come for the pine and the spruce at intervals of three or five years, generally more frequently in the southern part of the country, and more rarely in the northern. The germinating power of the seed is great, often more than 90 %. Our coniferous trees satisfy for the greater part the needs of the country, as far as concerns building material, fuel and material for fencing. Of the timber intended for sale, considerable quantities are sold abroad, partly as round timber (spars, pit props, etc.), partly as balks, partly prepared, as sawn or planed timber and staves. The still further improvement of export timber has of late been tried with great success, and a market has been found abroad for entirely completed building material, windows, doors, etc. The Norwegian spruce contains a relatively small quantity of resin, and is therefore increasingly employed in the production of mechanical and chemical wood pulp, an industry which has gradually gained such importance, that in some places it has begun to threaten the very existence of the forests. The spruce bark is used for tanning. In many places of the country

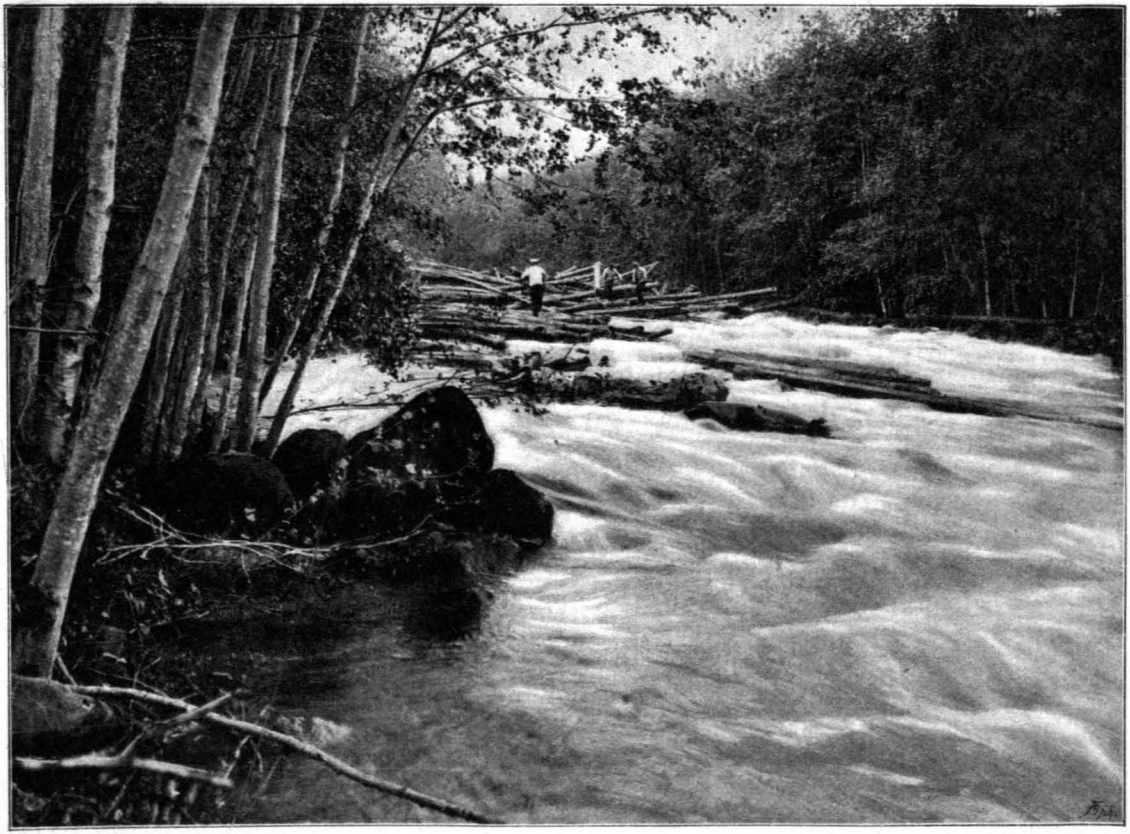
tar manufacturing is carried on as an additional industry, and for that purpose pine roots are used.

Two species of birch occur as forest tree — lowland or white birch, and mountain birch. The mountain birch grows everywhere in Norway, as far north as the country extends. Its limit is somewhat more than 650 feet higher than that of the pine. In the southern part of the country, both species of birch are found together, as a rule mixed with other trees; and they only form uniform continuous forests in the mountains and in the northern part of the country where the coniferous trees cannot spread and multiply. With its light colour, however, and its delicate drooping branches, the birch is also rather prominent in the lowlands. It brightens up the dark coniferous forests, and appears in groves scattered between farm fields and grazing-lands. These birch groves often determine the character of the landscape, on account of the animation and variety which they produce. It is only in the most northern countries that the weeping birch («the lady of the wood») attains its full beauty. In our country it is not only one of the most beautiful trees, but also one of the most useful. The wood is used as fuel and as material for many kinds of tools, vessels, staves, etc.; the inside bark for tanning purposes, and the outside bark especially for covering roofs; and finally, the leaves are fodder for cattle. The tree probably requires, on an average, a period of from 80 to 100 years for its normal development, and may attain the height of 80 feet with a diameter, at breast height, of about 5 feet. In the mountains and in Finmarken, the birch as a rule is reproduced by ground shoots, more rarely by seeds. In addition to the birch, other foliage trees grow in the lowlands, partly as ornaments on the home fields around the farms, but especially in the grazing fields and grass meadows, where, together with the birch, they form groves, but rarely real woods. Of such trees may be mentioned the aspen *(Populus tremula)* of which the wood is used in manufacturing matches, the rowan *(Sorbus aucuparia)*, willow *(Salix)*, alder *(Alnus incana* and *glutinosa)*, hazel *(Corylus avellana)*, ash *(Fraxinus excelsior)* which is considered especially adapted as material for manufacturing «ski» (Norwegian snowshoes), lime *(Tilia parvifolia)*, maple *(Acer platanoides)*. The foliage and bark are to some extent fodder for cattle.

The value of our export of forest products and of the timber industry for the year 1897 is estimated at 62,000,000 kroner.

Work in the forests is hard and often dangerous, and requires strong and hardy men. Consequently a relatively large number of timber workers are single men, still in their youth. According to the last census of 1891, there were then 19,451 persons in this country, earning their livelihood by working in the forests. The felling of timber takes place in the autumn and winter, beginning from the middle of September, or somewhat later. The large forests, as a rule, lie far away from the inhabited districts, and the timber cutters and drivers have to live in huts built for the occasion, the interstices being filled and the roof covered with pine needles and branches, moss, etc. Week after week may be spent by them in the forests, in the hardest frosts, the work being interrupted only once in a while by a Sunday visit down to inhabited districts on ski. They do their own plain cooking in their log hut, where a flaming log-fire heats the room during the night and cooks the meals. The horses are also subject to great hardships, and it is fortunate that the Norwegian horse is hardy and enduring. Of late it has become more general to put up a kind of a stable, but often the horses have to remain outside in the winter's cold, covered with a woollen blanket; and if it is too cold for this, it is necessary to keep on driving during the night also. The timber is stripped of its bark and collected in convenient places; and when the snow is sufficiently deep, and the bogs are frozen, it is then dragged to some river, as a rule a tributary to a larger water-course used for drifting timber, where it is piled in great heaps. Here, on the bank of the river or on the ice, it is as a rule «accepted» by the purchaser or his timber marker, and is stamped or marked with the marking-axe or stamp of the purchaser. In the spring, when the ice is broken and the snow melts, the timber is turned into the river and carried on the freshet to the main river, where thousands and even hundreds of thousands of logs may float simultaneously, each log as a rule floating by itself. In waterways which have been canalized and over lakes, it is often the custom to float the timber in rafts. The river-drivers must be quickwitted and hardy men, who can carry on their work night and day, if necessary; they must also be experts in their work, and familiar with the waterway. They must regulate the letting out of the timber so that no more is turned into the river at once than it can carry; and they must see that the logs do not go ashore anywhere, or stick in the

narrow rapids between the rocky banks or on rocks, points or sandy bars in the river. If a log has been allowed to stick fast across the course, increasing quantities may be piled up, to the number of thousands of logs, stopping everything that comes down, and finally preventing, not only the floating, but even the free course of the water. Sometimes the pressure of the increasing bulk of water may cause the infiltrated timber to yield, and the loosened heap breaks forth on a wild and rampant course, breaking and splitting the timber that comes in its way, and often continuing its wild course for long distances down the rivers, menacing or destroying factories, bridges, dams, and all kinds of constructions on its way. As a rule, however, the river-drivers must interfere. Stepping out on the loose logs, and balancing on them, they loosen one log after another by means of their boat-hook, until at last the whole remaining bulk of timber is put into motion,when the vital question for the timbermen is to save themselves. In the narrow channels and the smaller waterways it is, as a rule, a single log or a few logs that block up the tangled mass of timber. To discover the hindering logs and cut them, is often a very hazardous task. If the bank of the river is steep and high, the driver is tied to a rope or he may be put into a kind of harness and tied with ropes to both banks of the river, so that his fellow workmen by tightening the rope can lift him up and pull him ashore, as soon as the tangled mass of timber is loosened. The rivers also form eddies and whirlpools under the waterfalls, where the timber accumulates and moves in a circle, and here, too, it may sometimes be necessary to remove it log by log. Timber-merchants and forest owners work in the big waterways for a common account. The expenses are divided, and matters of common concern are settled by a chosen administration. These timber-floating associations are of great importance for forestry as well as for the timber business, and are dealt with in a separate chapter of the general act of July 1st, 1887 relating to waterways. It is important in several respects to have the timber conveyed quickly, the more so as, if it is left in the river through the summer, it is either liable to crack, in dry summers, or to become saturated to such a degree that it will sink. The waterways serving as the means of transport for timber, have therefore been cleaned, dams have been built in the lakes and ponds in order to accumulate water, bulkheads have been con-



Timber floating in a tributary river to Glommen.

structed, and protective measures of various kinds executed, and booms have been laid partly to regulate the flow, partly to collect the timber and sort it according to the several marks. By means of shoots blasted out of the rock or constructed of wood-work, an attempt has been made to get past waterfalls, where the timber would otherwise be liable to be destroyed or injured, in an easy and cheap manner. Timber shoots, dry or aquiferous, are also employed in order to carry the timber down mountain slopes and across rugged ground and wherever transport by means of horses would not be practicable, or at least would be too expensive.

Historical records, as well as investigations of the soil, especially of the bogs, give us the certainty that Norway in former times had much more forest than it has now. It is on the mountains and the coast especially that the forests have disappeared. As far north as the 62nd degree of latitude, pine roots and actual remnants of forest are found in bogs which may be situated more than 330 feet above the highest limit of the pine at the present time. To mention an instance, the records show that in the neighbourhood of the present mountain town of Røros, so dense and luxuriant a pine forest was growing about three hundred years ago that it was necessary to blaze a path with an axe across regions which no later than the end of the eighteenth century had to be considered as devoid of forest. In other places, for instance in the table-land of the Dovrefjeld, the pine has been partly supplanted by the birch. But even the birch forest has to a certain extent had to yield and withdraw from the highest mountain slopes. Our knowledge of forest matters during earlier times is, however, rather defective. The exportation of timber and forest products was hardly of any importance before the Hansards, in the fourteenth century, commenced to appropriate the commerce of the country, and it only assumed a more considerable extent through the commerce in the sixteenth century with the Dutch, and in the seventeenth century also with the Scotch and English. It is probable, that the coast forests in the west and south of the country were cut out about this time, and this was particularly the case with the splendid oak forests, so that from about the middle of the seventeenth century it became necessary to commence cutting in the nearest inland parts. At the same time the mining industry was making rapid progress, and for the last three hundred years has consumed exceedingly

large quantities of timber. These circumstances, in addition to forest fires, injury caused by insects, and the increasing consumption caused by the increase of the population and the demands of trade, have been the constant cause of the gradual disappearance of the forests of the country, while imprudent or reckless cutting, excessive grazing and similar circumstances, have prevented their recovery by growth, the consequence being that the forest-land in the weather-beaten regions of the country has been turned into a desolate wilderness, as may now be seen along the coast and on the bare plateaus of the mountains. The outfarming in the south, and the breeding of reindeer in the north continue this work of destruction this very day. Attention was early called to the disappearance of the forest, and since about the middle of the sixteenth century attempts have been made to stop the devastation by different legal enactments, especially directed against the cutting for export sale, and against the free carrying on of saw-mills. Most of these restrictions, which often combined heavy penalties with unreasonable and impracticable regulations, were repealed in 1795. The saw-mill privileges, however, were only done away with in 1860. The wood industry since that time has been free. Every private person has been able to treat his forest as he pleases; and this freedom, combined with the improved communication and the high timber-prices, has caused many a mountain forest to be permanently destroyed, and many a lowland forest to be injured for a long time to come. The forest act of June 22nd, 1863, prevented the establishment of ruinous rights of use. But the continued illtreatment of private forests has compelled the state authorities to take still further steps. By an act of June 27th, 1892, the exportation of forest products from the three northernmost counties has been forbidden, and by an act of July 20th, 1893, the municipalities have had the opportunity afforded them of protecting such forests as are necessary for the sheltering of the other growing forests, or forests which seem liable to be destroyed by illtreatment. When at the end of the century, we still have so many mountain and polar forests left, this is often due to the fact that the state has from time immemorial owned these out-of-the-way regions, which have become valuable on account of the improved facilities of transit and the high prices prevailing at the present time; half a century ago, before a public administration of the forests had been organised, it was especially

the site of these forests and the slight value of forestry products that protected them from complete ruin. Those mountain and forest regions which at the time of the country's colonisation remained without being taken into possession by anybody are called «almenninger» (commons). The neighbouring settlements in Norway, as in other Teutonic countries, have always exercised certain rights to the use of the commons, and these rights were retained by the peasants of the country when the commons and Finmarken, at the establishment of the monarchy in the 9th century, were declared to be the property of the king. The inhabitants of the neighbouring district are, as a rule, entitled to take from the forest the timber products necessary for the needs of their farms, and they also have grazing privileges in the low-land commons as well as in the mountains, and fishing and hunting privileges. In former times — from the end of the 17th to the middle of the 19th centuries — the state disposed of the best commons when the Exchequer was in need. In this way part of the forests passed into private ownership, the rest becoming the property of the inhabited district, being what is called a district-common («bygdealmenning»). The administration of the state and district commons is fixed by law.

It was only in 1857 that an effective control of the public forests was established in Norway, the attempts which had been made about the middle of the 18th century to introduce a regular forest administration having soon been discontinued. The forestry administration is now a part of the agricultural department, having a forestry director as its chief, and four forestry inspectors, 25 forestry managers, 2 forestry assistants, 10 forest planters, and 358 overseers and rangers as the working staff. An appraisement of the forests and the preparation of regular plans for their exploitation have been commenced, commercial nurseries have been established in several places, as well as establishments for the collecting and sale of forest-tree seeds, the largest two being at Hamar and at Voss. Elementary instruction in the treatment and cultivation of forests is given at three forestry schools, and advanced instruction at the Agricultural College. In the course of the last 30 or 40 years, planting and scientific cultivation of forests have been undertaken both by the state — for instance in the treeless districts of Jæderen, near Stavanger, where the state has planted a territory of 4 sq. miles — and by private

persons with the assistance of the state. During the last two or three years the interest in private forest planting has grown rapidly, and has led to the establishment, in 1898, of a forestry society, embracing the whole country, and of which a forestry engineer, paid by the state, has the professional management. Forest-planting is gradually being introduced as a subject in the primary schools.

The public forests are partly *state «commons»* . . (which the districts within which they are situated have the right to use), and	840	sq. miles
state forests	2,241	—
partly forests belonging to state farms used as official residences by public officers, and forests belonging to the «Fund for the Advancement of Education»	254	—
Total	3,335	sq. miles
District commons	722	—
	4,057	sq. miles

This does not include the forests belonging to the Kongsberg silver-mines, amounting to 50 sq. miles, and more than 77 sq. miles of forest belonging to the so-called Angell Charities. Of the «state forests» — about 1,293 sq. miles, or more than one half, are located in the counties of Tromsø and Finmarken. These northernmost state forests, as well as the many state commons and state forests situated in the mountains in the southern part of the country are not very productive. Since the year 1860 it has been the rule to appropriate money for the purpose of purchasing forests for the state, especially in districts nearly destitute of forests, and for the purpose of acquiring forests for the protection of other forests. This appropriation has of late years amounted to kr. 64,000 per annum, besides extraordinary grants for larger purchases. The greater part of the forest area purchased has not yet been restored to a good condition after previous illtreatment. According as the condition of the public forests improves, the better will their financial status be, in comparison with what it has been up to the present time, although the numerous and troublesome privileges will always require relatively large expenses of administration. The aggregate gross yield for the years 1859—90 amounted to kr. 9,233,717, and the total net yield to

kr. 3,284,929. By deducting those expenses that have reference to the forest management proper and should be covered by it, namely expenses of administration and exploitation, the net yield is kr. 4,308,306. The purchase-price for forests purchased, the sale-price of farm-land re-sold, and interest are entered neither as revenues nor expenses. The state commons, the state forests, and those forests belonging to the Fund for the Advancement of Education that are under effective control, are estimated at a value of about kr. 15,250,000, without deduction for the value of the privileges encumbering them, and with deduction for the privileges, at about kr. 10,000,000. This estimate, however, in all probability is too high. The value of the district-commons, without deduction for privileges, is estimated at about kr. 9,275,000.

In several parts of the country, however, there is very slight opportunity or none at all of obtaining a supply of forestry products; and the population has therefore, from time immemorial, been wont to use peat as fuel. This is especially the case on the coast in the western and northern parts of the country. Of late years it has also been attempted to make use of the inland bogs for this purpose. Bogs are found almost everywhere in the country, on the desolate table-lands, down the mountain-slopes to the bottom of the valleys, in the inhabited districts inland, as well as on the most distant islands in the western and northern parts of the country. The bogs, properly so called, are sometimes «high-moors» or moss lands, consisting chiefly of sphagnum with a bottom layer of fuel peat, and sometimes grass bogs (tarn bogs) and forest bogs, which are mostly found in the western part of the country and northwards, and contain, among other decayed plant matter, numerous remnants of the luxuriant forests of former times. The fuel peat here occurs in thick strata, from 3 feet up to 20 feet. The peat industry is even now of considerable importance for the fuel supply of the country, and will in the future be of still greater importance. The bogs of Norway are estimated to cover an area of 4,630 sq. miles, or 3.7 % of the surface of the country. This calculation, however, is perhaps too low, and other estimates seem to be in favour of supposing a much larger area of bogs, with such quantities of peat for industrial purposes as might counterbalance the firing value of the collected coalimports of the country for centuries. The fuel peat may be taken out of the bog with a spade in square pieces, which are then stacked and

dried in the open air, or it may be moulded and kneaded in low movable boxes, and afterwards dried in the open air, or, finally, prepared by means of a specially constructed machine. The peat harvest commences as early in the spring as possible, as soon as the danger of night frosts is past. In 1897 a peat master was appointed for Finmarken with some overseers as his assistants. Before that time, some counties had certain officers engaged for the purpose of instructing the population in the exploitation of the peat bogs. But the matter has not as yet received the attention in this country which it deserves.

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FISHERIES

THE fisheries, together with hunting, are entitled to be considered the oldest of this country's livelihoods. More than a thousand years ago, according to the old sagas, «splendid painted ships, with sails of several colours» sailed with fish from Norway to England. In the course of time, the fishing naturally lost its character as the principal means of subsistence, especially in the southern parts of the country; but it is still one of the most important in our land.

The value of the *large fisheries*, according to the prices paid to the fishermen at the first sale, has varied during the last 31 years from 14.8 million kr. in 1887 to 29.4 million in 1877. The average for the period is 22.3 million. This does not include the proceeds of the «*daily fishing*» carried on all along the coast to supply the wants of the people themselves, nor yet all the industries and trades that are associated with this occupation. Thus while the fishermen's earnings at the large fisheries in 1897 amounted to about 25 million kr., the value of the year's exportation of fish alone was about 52 million. The total receipts of the entire trade, the large fisheries, the daily fishing for private consumption, and the various extra sources of profit, cannot amount to much less than 60 million kr., or about 10 % of the estimated total national income. If we compare the above amount, 22.3 million, which constitutes the average annual receipts of the fishermen at the large fisheries, with similar figures from other countries, it will be seen that the profits of the Danish fisheries are about 5.5 million, and of the English about 80 million kr.

THE SEA FISHERIES.

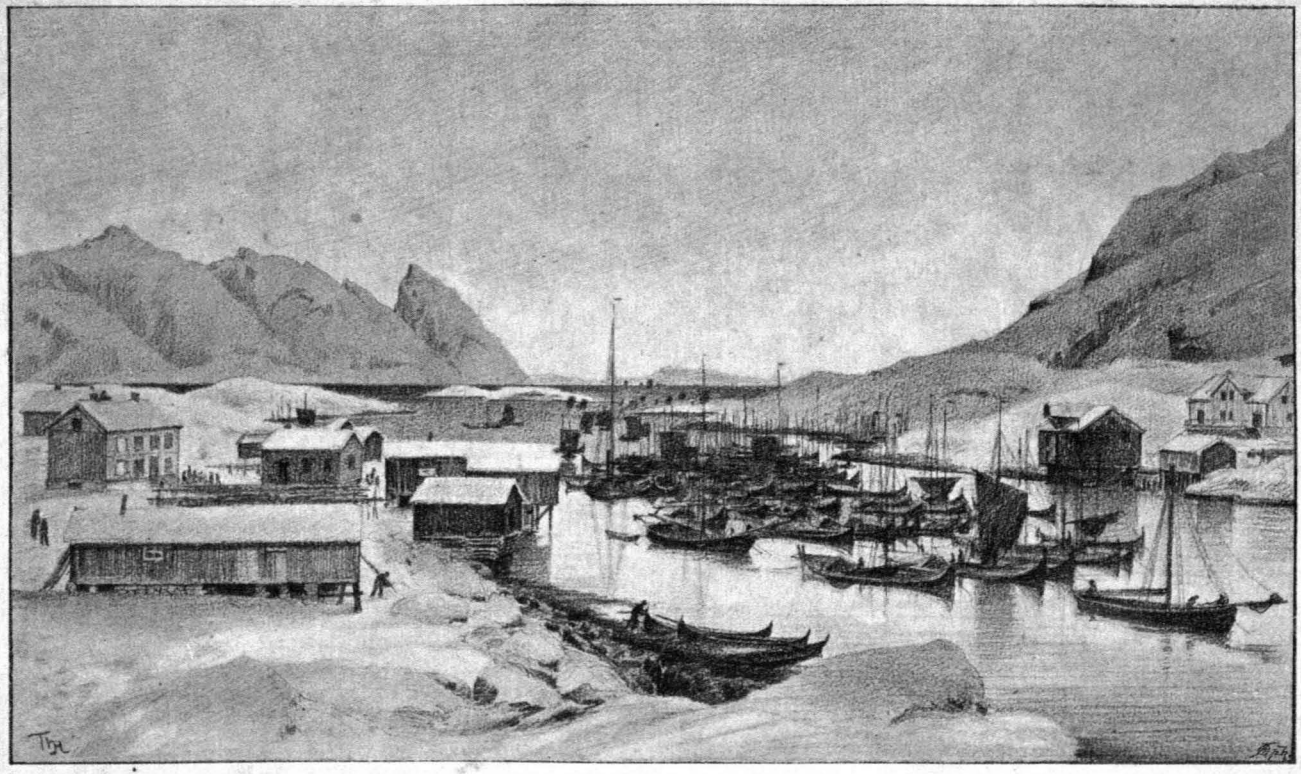
The sea fisheries are those which play by far the most important part among the Norwegian fisheries. They have their peculiar stamp from the natural conditions and geographical features of the coast. The Norwegian coast-line is exceedingly long. Its importance is still more increased by its curved lines, its deep inlets, and its numerous islands and rocks. All along this coast, fishing is carried on, although of very various kinds.

The coast of Norway slopes very steeply down to comparatively great ocean depths. Whereas, for instance, the English coast, in many places, sinks only 1 fathom below the surface of the water in every mile out from the shore, on the Norwegian coast 1 mile from the shore, and sometimes in the very fjords, we find depths of from 100 to 600 fathoms. These submarine declivities generally have rocky sides of the same form as the coast above the surface of the sea; and only at an average depth of 100—200 fathoms do we find the large levels covered with the softest of mud. At this depth, too, there are great plateaus off the coast, with a breadth of about 60 miles, the so-called coast-banks, which stretch in a curved line from Stad up towards Spitzbergen, and form a kind of rampart on the land side. Outside the coast-banks, the bottom sinks to the 1000—2000 fathoms of the North Atlantic Sea depth.

This circumstance determines the nature of the submarine fauna and consequently of the fisheries.

While a flat sandy shore offers the best conditions for all kinds of flat fish (the flounder family, plaice, sole, turbot) and shallow-water forms such as the eel, prawn, etc., the majority of the food-fish of Norway belong to the so-called round-fish (especially the cod family — cod, green-cod, haddock, etc.). Only a few typical deep-water forms of flat fish are found in any great numbers, such as the mighty halibut. The Norwegian coast, moreover, affords a unique opportunity for the capture of migratory fish (herring, mackerel), because the channels between the numerous islands and rocks permit of navigation with small vessels to a greater extent than any other coast.

In Norway, *lines* are by far the most important fishing-gear, partly in the form of hand-lines, partly as long-lines. In addition



Fishing station in Lofoten. After a sketch by Mr. Holmboe.

to these, *nets* are much used, partly drifting or floating (for herring and mackerel), partly seine-nets (cod and herring). Only two kinds of sweep-nets are mainly used, namely large herring-nets, long walls of net, with which the herring are shut in in the bays and sounds, and the so-called «synkenøter», pieces of net 40 fathoms square. This implement is managed by 4 boats at a time. It is laid flat upon the bottom, and is hauled up by ropes at all four corners simultaneously.

The species that play the most important part among Norwegian fish all appear to be northern animal forms, and in accordance with this, the sea is far richer in the northern than in the southern districts. In this way, about 80 per cent of the large fisheries are north of Stad.

The largest Norwegian fisheries are, moreover, *periodic*, and of such regularity that there are fisheries that have been carried on for thousands of years, and yet the fish never seem to have failed to appear at their regular season, e.g. the famous Lofoten fishery. These periodic fisheries owe their existence to those species of fish that make regular annual migrations in to the coast, especially *cod*, *herring*, *mackerel* and *salmon*. In 1897, there were fished:

about	61.5	million	cod	value	$12^1/_2$ million kr.
»	42	»	gallons herring . . .	»	$7^1/_2$ » »
»	1.5	»	mackerel	»	$^1/_4$ » »
»	2.2	»	lbs. salmon & sea-trout	»	1 » »

Thus the most important fisheries are:

THE COD-FISHERIES.

The cod *(Gadus callarias)* seems to be a pronounced northern fish, whose distribution in a southerly direction extends to the Bay of Biscay. It is supposed to live generally upon the great ocean banks. Thence it migrates to the coast at regular seasons, viz. (1) a spawning migration in the months January to April, during which time great numbers of fish approach the shore in order to spawn, the spawn floating on the surface of the sea; and (2) a migration in search of food, during which the cod, especially in the north of the country, pursues great quantities of fish which constitute its food. Among these fish, the so-called capelan *(Mallotus villosus)* plays the most important part.

The spawning migration takes place all along the coast. More cod are therefore fished everywhere in the months of March and April than at other times of the year. These cod are large, sexually matured fish, the so-called sea-cod or «skrei». At certain points of the coast, sea-cod fishing was long ago carried on more than elsewhere, especially in the Romsdal, Nordland and Tromsø counties, and above all at the Lofoten Islands in the Nordland county. Here, during the first few months of the year, about 40,000 men are gathered. Of these, in 1895, 30 per cent fished with nets, 66 per cent with long-lines, and 4 per cent with hook and line.

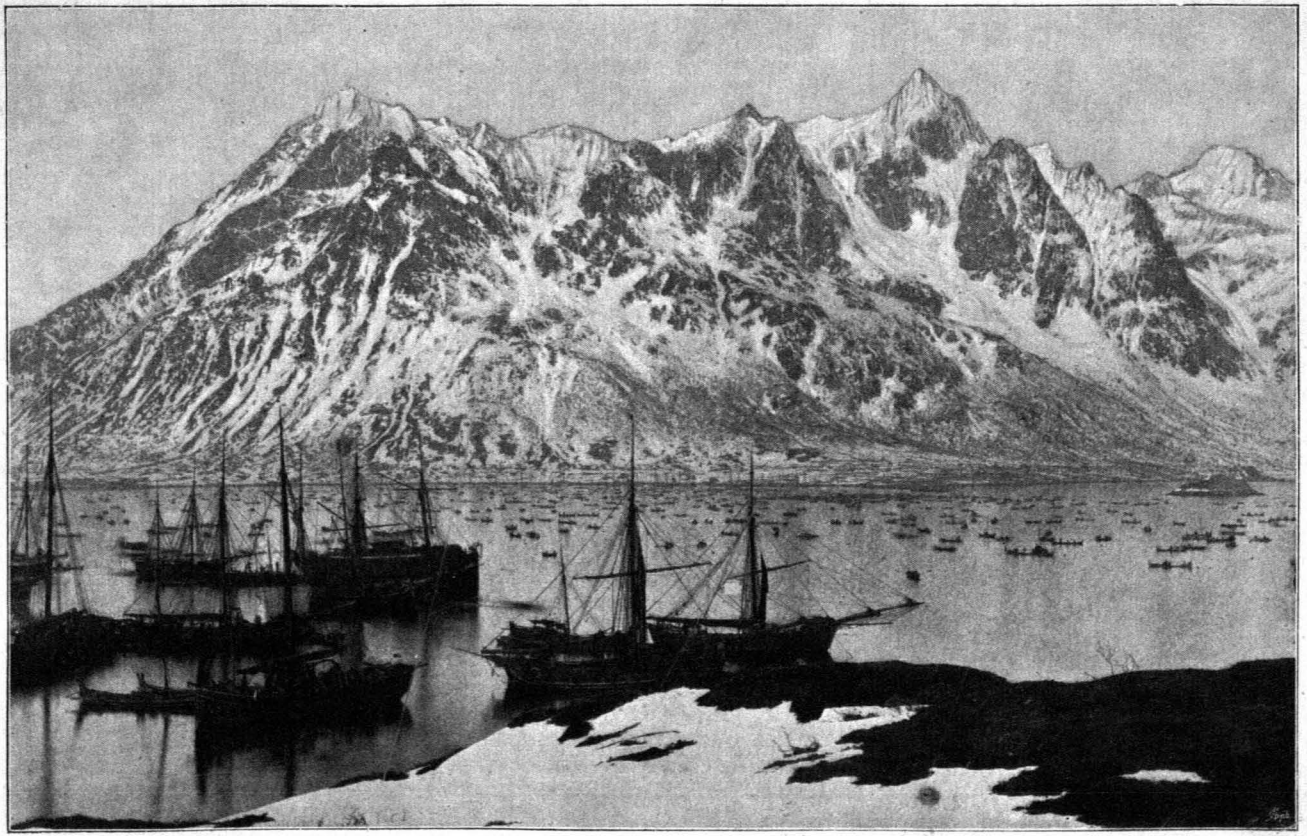
The Lofoten fishing is carried on from several — about 36 — fishing stations, «fiskever», havens with the necessary buildings along the shore. Some of these buildings are the warehouses of the traders, some the fishermen's booths, which are small, sometimes extremely primitive houses right upon the shore, and serve for keeping fishing-tackle in, as places for putting on bait, and as dwelling-rooms for from 12 to 24 men. The house generally contains only one large room, and sometimes an attic.

At one station, there may be from 3 to 4 thousand men, and in the morning, at a given signal, a whole fleet sails or rows out to the fishing-places, which are sometimes as much as 8 miles from land. The vessels all make use of sails, and most of them are open, without any deck. The largest, ten-oared boats, of 7 or 8 tons register, and a crew of 6 men, use lengths of net measuring from 700 to 1300 yards. The single nets are from 27 to 33 yards in length, and have a mesh of from 3 to 3½ inches. They are sometimes laid along the bottom, sometimes more or less near the surface, are put out before night-fall, and drawn up again in the morning.

Long-line fishing is carried on from somewhat smaller boats, eight-oared, of from 3 to 3½ tons register, and a crew of from 3 to 5 men. The lines may be from 1600 to 2700 yards in length with 1200—2000 hooks. Some of them are set during the day, others at night, and they are baited with herring or cuttle-fish.

The original fishing implement is the hand line. For these, small boats are used, of less than 1 ton's register, with a crew of 2 or 3 men, who are continually moving from place to place until they find the fish.

From 300 to 400 cod is reckoned a good day's fishing for a net-boat, and 200 for a long-line boat. The fishing is considered



View of a fjord during the «skrei» fishery.

very good when the results are respectively from 600 to 800, and 400; above these numbers, it is considered to be abundant. The average per man for the whole of the fishing may be estimated at from 900 to 1000 cod, but this number has varied from 550 in 1883 to 1310 in 1877. The average net profits per diem, are put down at kr. 1.52 for a net fisherman, kr. 1.68 for a long-line fisherman, and kr. 1.31 for a hand-line fisherman, to which, in the case of all, may be added board and lodging. In spite of these not particularly large average net profits, fishermen flock annually to Lofoten from a great part of the country.

A large trade and a preserving industry are associated with the Lofoten fisheries. The fish is bought partly by traders on shore, who have their warehouses with salting-room, storing-room, etc. here, partly and principally by merchant-vessels, of which there are sometimes as many as 700 on the spot at one time.

The fish is sold by number — in 1896, for instance, at an average of kr. 28.60 per 100. The weight varies from 9 to 20 lbs., but cod have been taken weighing 90 lbs., and with a length of 5.4 ft. If the average weight of a fish is reckoned at 10 lbs., the price will be about kr. 0.03 per lb.

The fish is prepared, as a rule, either as *klipfisk* (salted and dried) or as *tørfisk* (stock-fish). Among the secondary products, the heads are used for fodder and manure, the roe for bait, and the liver for oil. The profits of the Lofoten fisheries for the years 1894—96 will be seen from the following table:

Year	Klip-fisk	Tør-fisk	Total	Heads	Roe	Cod-li-ver-Oil	Train Oil	Value
	Millions				1000 Gallons			Million kr.
1894	24.5	4.0	28.5	20.0	536.8	270.6	160.6	7
1895	31.4	7.2	38.6	28.9	924.0	270.6	83.6	6.9
1896	15.3	2.7	18.0	11.1	352.0	194.7	26.4	5.15

It will be seen from the above that the most important product is *klipfisk*. This is prepared by first being salted at the fishing stations themselves, and sent thence to the drying-places, where the fish is laid upon the flat rocks to dry. It is calculated that a cod weighing 10½ lbs yields 2.2 lbs of salted cod. This is partly due to the removal of the head and entrails, which, how-

ever, are put to other uses (manure, fodder, oil), partly to the diminution in the weight of the flesh, the salt drawing the water out. While the flesh of a living cod contains about 70 per cent water, salted cod contains 36.82 per cent water, and 15.5 per cent salt. In the preparation of salted cod, the value of the fish rises in the proportion of 100 to 142 or 143.

The preparation of salted cod was introduced by English merchants in the 17th century, and has gradually outstripped that undoubtedly very ancient product, *tørfisk*. In 1790, 216,000 cwt of this product were prepared, from 1836 to 1840, 295,000 cwt, and from 1887 to 1891, 335,000 cwt; while the corresponding quantities of klipfisk were 79,000, 197,000 and 917,000 cwt.

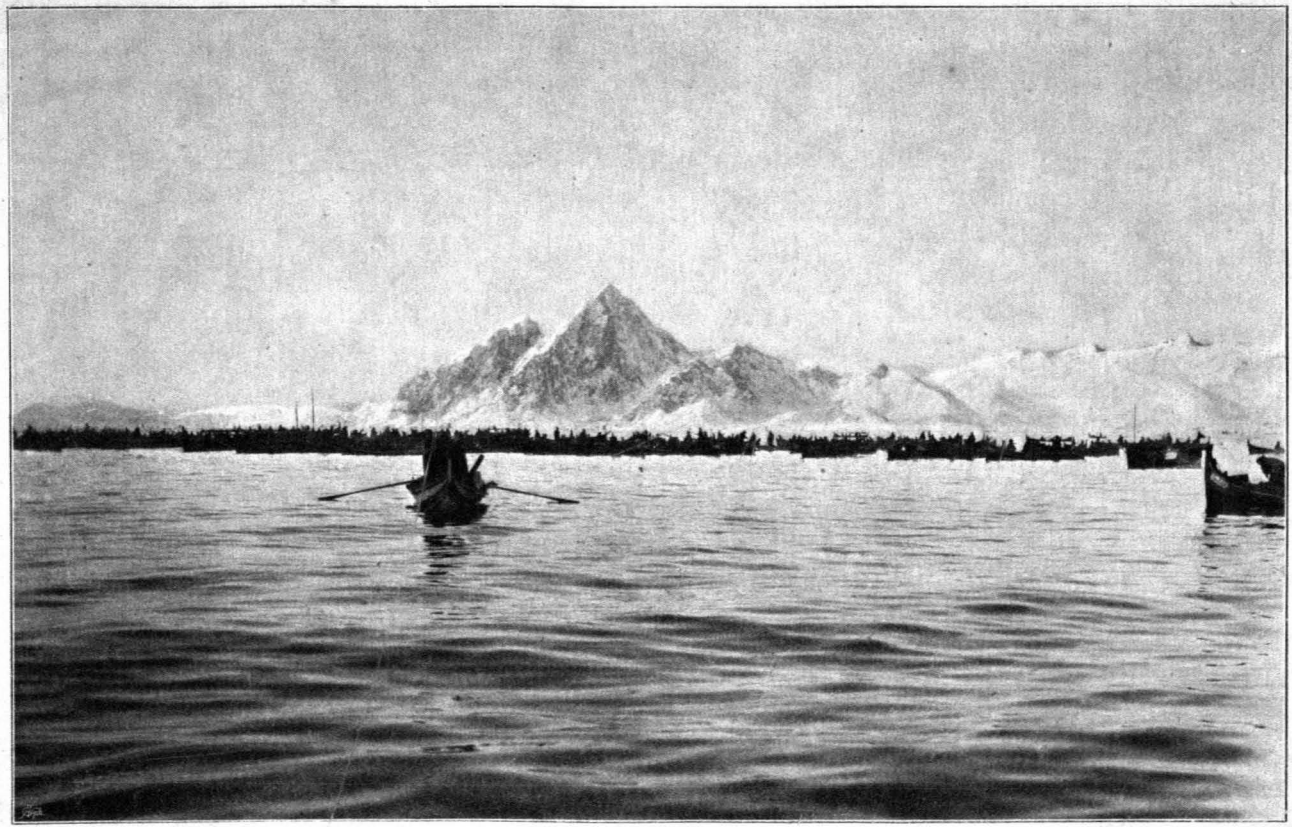
The preparation of tørfisk is in the main more simple than that of salted cod. When the fish is cleaned, and the head taken off, it is hung, generally in pairs, by the tail to dry upon wooden scaffolds, called *hjell* (flakes). According to ancient rules, no fish was to be hung up after the 12th April, or be taken down before the 12th June.

During the year 1897, there were exported:

Tørfisk		Klipfisk	
To Sweden	2,320 tons	To Spain	28,450 tons
» Italy & Austria	4,950 »	» Germany	8,720 »
» Holland	3,500 »	» Gt. Britain & Ireland	5,620 »
» Germany	3,280 »	» Italy	1,940 »
» Gt. Britain & Ireland	2,730 »	» Portugal & Madeira	2,450 »
» Russia & Finland	850 »		
» Belgium	170 »		

A part of this export, however, was sent on farther from the lands in question. Tørfisk is exported almost exclusively from Bergen, Trondhjem, Tromsø and the towns in Finmarken; klipfisk from Kristiansund, Bergen and Aalesund.

Among the secondary products, the liver oil takes an important place. The greater part is prepared as cod-liver-oil by exposing the liver to a jet of super-heated steam, which destroys the liver cells, and causes the small drops of oil to run together. The fishermen themselves, in olden times, had made train oil by letting the liver become rotten, or by melting it. Several sorts



Lorg-line fishing.

of oil are now produced, from brown oil to the finest white cod-liver-oil.

The roe is salted, and most of it sent to France, where it is used as bait in the sardine fisheries. In 1897, 1,323,000 gallons of roe were exported, the value being kr. 1,323,100.

In former times, the head and intestines were thrown away, and even now are far from being utilised as they should be. Of late years, however, manure has been exported for about one million kr.

Besides the above winter cod fisheries, there are also large cod fisheries at other seasons of the year. Among these, the «capelan-fishery» of Finmarken, during the months of April and May, occupies the most prominent position. In this, in 1897, 18,173 fishermen took part with 4777 boats. The fishery is called capelan-fishery because the cod is supposed to go landwards chiefly after the capelan *(Mallotus villosus)*, a fish of the salmon family, that is also used as bait. It seldom occurs in any quantity south of 65°, but in April and May it gathers round the coast of Finmarken in enormous numbers in order to spawn. Shoals of cod come after it, together with whales and birds, and revel in the abundance of capelan.

The fishing is carried on for the most part with deep-sea bait from ten-oared boats (see p. 356), manned by 5 men. The capelan fishery is a very uncertain one, as will be seen from the following table showing the profits of the fishery in Finmarken for the years 1895 and 1896.

	Cod	Haddock	Heads	Halibut cwt.	Liver galls.	Roe galls.	Profits kr.
1895 . . .	9,659,400	1,845,016	5,526,000	2,098	325,974	6,996	1,662,320
1896 . . .	16,982,200	2,579,000	8,875,500	5,500	767,184	9,108	4,769,892

In addition to these large periodic fisheries, fishing with hook and line for round fish is carried on all along the coast. This fishing is less periodic, and is only restricted on account of the weather, to the best time of the year, from April to September. These fisheries are long-line fisheries, especially for other kinds of fish, e.g. haddock *(Gadus æglefinus)*, ling *(Molva vulgaris)*, tusk *(Brosmius brosme)*, rose-fish *(Sebastes norvegicus)*, and the large deep-water flat-fish, halibut *(Hippoglossus vulgaris)*. This fishing

is pursued for the most part in deep-water (80—200 fathoms), and has developed in an especial manner in the Romsdal county, Vesteraalen and Finmarken, particularly on the banks outside Romsdal. Decked boats are employed here, cutters and even small steamers. This fishery was originally begun by Swedish North-Sea-fishermen. Its development may be seen from the following survey:

	1862	1873	1883	1890
Vessels, Norwegian	5	7	21	78
» Swedish	9	12	1	—
Fishermen	196	233	274	707
Ling taken (cwt)	6,690	24,000	27,000	—
Value of raw produce kr.	46,800	143,300	155,000	250,000

THE HERRING FISHERIES.

Next to the cod fisheries, the herring fisheries are the most important. They, too, are carried on all along the coast. In olden times the herring was only used fresh or dried, and then exclusively for home consumption; but after the invention of herring salting (by the Dutchman BEUCKEL, in 1416), a herring fishery was also developed in Norway for exportation, and in the year 1897, 29.6 million gallons of herring were exported, their value being kr. 18,000,000.

The herring fisheries have a still more variable character than the cod fisheries, and some years have even been altogether wanting. These variations have so affected the economy of entire districts, that good and bad times, as a whole, have been dependent upon them. It is a widely-spread belief that there are regular «herring periods», with good and bad herring years. Such periods have even been set at a certain number of years (about 30). As an instance of how great the variations can be in the profits of a single fishery, it may be stated that the so-called spring herring fisheries in certain years of the herring period 1840—70, could occupy as many as 30,000 men, and yield as much as 20 million gallons, and then sink down to almost nothing. In recent years, the herring seems to be once more returning.

The herring frequents our coasts only during short periods of the year. Suddenly, as if by a stroke of magic, the sea becomes

Drying «klipfisk».

full of herring, and then, after a time, is once more empty. It is especially twice a year that the herring thus comes in-shore, once in the winter, and once in the summer and autumn. The first is a spawning migration, during which the herring deposits its eggs upon the bottom among the thousands of islands and sounds round the coast, and it occurs, like that of the cod, all along the coast, but in many places only to a small extent. Where the pouring-in is great, large fisheries have sprung up, which have long been renowned. We have especially two such, the so-called spring-herring fishery, and the so-called winter, or large-herring fishery.

The *spring-herring fishery* (along the west coast in the Stavanger county and the Bergenhus counties) has always been concentrated about certain fixed points, especially the towns of Stavanger and Haugesund, and the fishing-stations lying off them.

The *large-herring fishery* (in the Tromsø county, Nordland and the Romsdal) occurs earlier in the winter, especially in November and December. The large herring is not fit for spawning until the new year, and is subsequently supposed to spawn in smaller shoals far out at sea. In its best years, this fishing has given employment to 20,000 men, and yielded as much as 18 million gallons.

All the other herring fisheries take place in the summer or autumn, and are generally called «summer herring» or «fat herring fisheries». The herring is then supposed to approach the coast in search of food among the abundant masses of drifting organisms — the plankton — that with the autumn develope in the in-shore waters. Such fisheries are found, some in the more northerly counties (Nordland and Tromsø), some in the Romsdal county, and some — though only occasionally — in south-eastern Norway, round the mouth of the Kristiania Fjord (east-country fishing). To show how the fishing is distributed along the coast, it may be mentioned that in 1897, the proceeds were as follows:

Søndre Bergenhus	kr. 138,205	Nordre Trondhjem	kr. 119,025
Nordre »	» 77,838	Nordland. . . .	» 2,013,711
Romsdal	» 102,787	Tromsø	» 667,460
Søndre Trondhjem	» 63,010	Finmarken . . .	» 9,600

To show how variable the fishing can be in one place, it may be stated that the profits in the Romsdal county in 1886 were kr. 191,834, in 1888 kr. 872,146, and in 1891 kr. 2755.

In all these fisheries the fishing is always carried on with the same kind of tackle, and all in one way. It is for the most part among the islands, where the favourable conditions as regards havens, and the fact that the herring goes right in among the islands, makes it possible to employ small boats, and to lay the nets along the bottom as permanently anchored appliances, or else to shut the herring into a bay with long walls of net, and then bale them up out of the shoal in the net. On the other hand, this fishery, in which the herring is waited for, is more variable than those in which the fish is sought for. This latter method of fishing has therefore of late years gained ground in certain parts of this country.

The nets are kept floating by cork or glass balls and kegs, and are attached to the bottom with stones, or anchored with grapnels. By means of cords from the weights and up to the kegs, the nets can be placed higher or lower, according to the path that the herring is taking.

The seine-nets are often as much as 800 feet in length, and from 100 to 130 feet deep. The fishermen live and keep their tackle in receiving-vessels (generally of the sloop type). Smaller boats are moreover employed in net-fishing, and also large seine boats, into which the herring is taken.

The shutting in of the herring requires many years' experience, and a special aptitude. There is a head among the crew, called the master-seiner. His special ability consists in being able to judge when there are sufficient herring for putting out the nets. To judge of this, the fishermen have signs founded upon long experience, such as whales and birds following the shoals. A lead is moreover employed for the purpose of feeling whether the herrings are there, and determining the «herring density». In such catches there have sometimes been taken 20,000 barrels (of 30 gallons) at kr. 10—12.

As a ware, herring varies very much. The spring herring is thin, as the fat diminishes during the maturing of the sexual products. The summer herring, on the other hand, has small sexual organs, and large accumulations of fat. The herring is generally preserved by salting. Of late years, too, a certain amount of fresh and smoked herring has been exported. The herring is bought up by traders on shore, or by merchant vessels. In the process of salting, the organs that contain the largest quantity of blood, such as

the heart and gills, are first removed. The herring is then laid in barrels in layers with salt between. The barrels are carried to the storing-places, where the herring is sorted, and again laid in barrels with brine. There are many degrees in the goodness and value of the salted herring, varying according to the care and exactitude with which the salting is performed.

The exportation of Norwegian herring is chiefly from Bergen, Haugesund, Trondhjem and Stavanger, to Germany, Sweden and Russia.

MACKEREL FISHING,

in the nineties, has yielded results varying from 1,117,000 mackerels (value kr. 194,000) in 1896, to 5,381,000 mackerels (value kr. 659,000) in 1891.

The mackerel *(Scomber scombrus)* is rare north of the Trondhjem Fjord, and is fished partly in the Skagerak and the fjords off it, partly in the North Sea by large boats. In the summer of 1894, for instance, 426 vessels with 2920 men were fishing in the North Sea. In the fjords, the mackerel is only found in the summer, when on a spawning migration, and it is then caught either with lines baited with herring, or with nets, or it is shut into bays and taken with seine-nets.

Until 50 years ago, the

SALMON FISHERIES

were principally river fisheries. Circumstances underwent a change on the introduction of the bag-net, a wedge-shaped net, made permanently fast. In the year 1896, for instance, the proceeds of the river salmon-fisheries were kr. 224,688, but of the sea-fisheries kr. 845,291, total, kr. 1,069,979, to which must be added about kr. 200,000 paid by sportsmen for the renting of rivers.

The salmon is fished all along the coast, from the 1st May to the end of August. The best districts have hitherto been the Trondhjem and Bergen counties.

Fishing in the rivers is carried on partly with rod as a sport, but chiefly with seine-nets, with which, at the mouths of rivers especially, capital hauls may be made.

Salmon is exported via Trondhjem to Sweden, Denmark and Germany, and via Bergen to England.

DAILY FISHERIES.

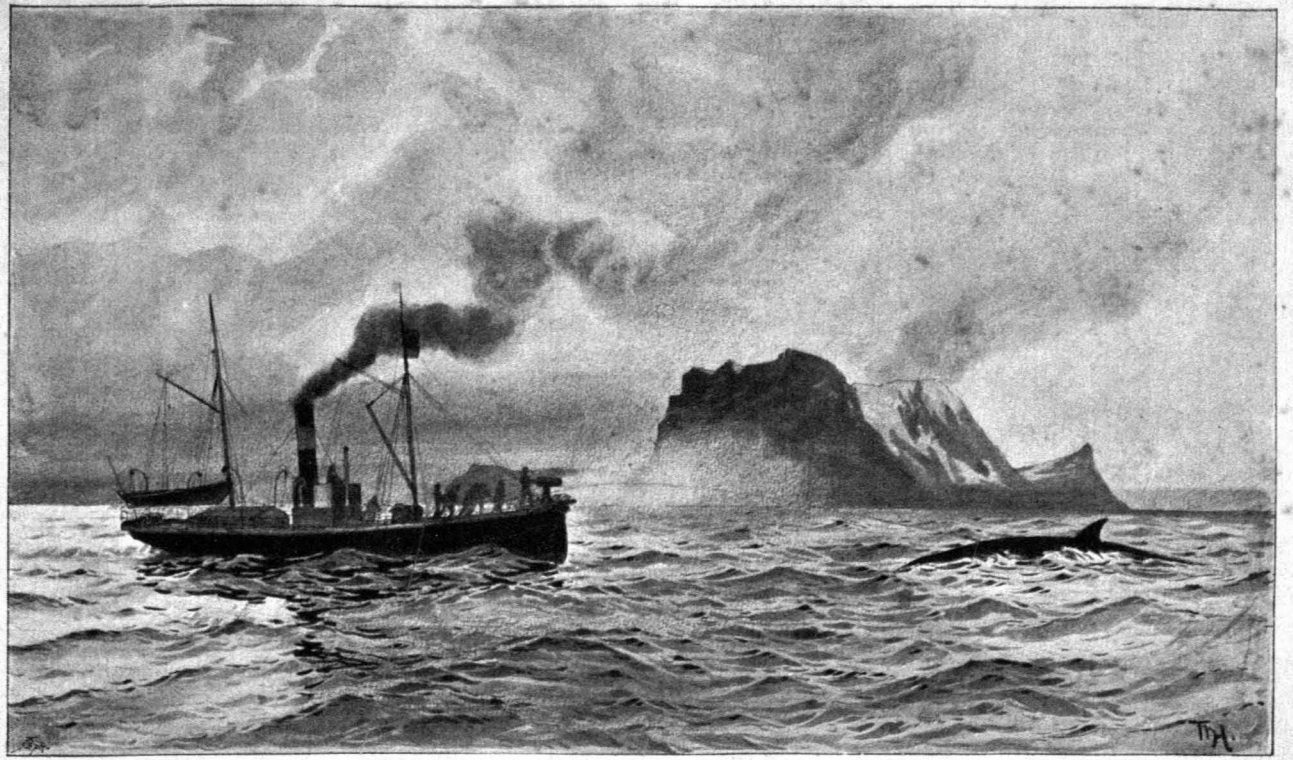
In addition to these periodic fisheries, a certain amount of more regular fishing called *daily fishing* goes on all along the coast, chiefly to supply the wants of the coast population. Calculations respecting this fishing are only forthcoming from a few places. In Lofoten and Vesteraalen, for instance, the consumption of fish is estimated at kr. 150,000 annually, the supply coming to the Kristiania wharfs from the Kristiania Fjord, at from kr. 400,000 to kr. 500,000, and so forth.

These fisheries are for green-cod *(Gadus virens*, chiefly in the north and west), cod, haddock *(Gadus æglefinus)*, whiting *(Gadus merlangus*, especially in the south), the flounder species, small herring, lobster, oysters, etc. The fishing is from the head to the mouth of the fjords. As a rule, the sea-fishing is far better than the fjord fishing. The daily fishing is the most important for the coast population, and in many places supplies their chief means of subsistence. Altogether it represents a value of several million kroner. Out on the open coast, large fisheries have been developed, large vessels (smacks and some steamers) having ventured out to the coast banks, e.g. off Romsdal and Vesteraalen. Beyond this, Norway has taken no part in the great competition in fishing in the North Sea. And of the fisheries not on Norwegian shores, the arctic fisheries are the only ones prosecuted by Norwegian fishermen.

THE ARCTIC FISHERIES

extend over the whole of the Arctic Sea from Greenland and Jan Mayen Island in the west, to Spitzbergen, Novaya Zemlya, the Murman coast and Finmarken in the east.

Farthest west, on the «West Ice», close to Jan Mayen and in the sea between Greenland and Iceland, the harp seal *(Phoca grænlandica)* and the hooded seal *(Cystophora cristata)* are hunted. These animals are either shot or felled upon the ice, where they gather in the spring, in certain places, in great numbers, to give birth to their young. The rest of the year, they live scattered over the sea. This fishery is very hazardous and costly. In 1897, 13 steamers were equipped from southern Norway, with 619 men.



Whale fishery. After a sketch by Mr. Holmboe.

The proceeds were about 60,000 seal-skins, 13,500 barrels of blubber, 203 whales (bottlenose, *Hyperoodon diodon)* and 11 polar bears, at a total value of about kr. 650,000.

In the same locality, during the summer, whale-fisheries are carried on for the bottlenose whale, — in 1897 by 65 vessels (10 of which were steamers), and about 1000 men. Whales to the number of 2141 were captured, valuing kr. 550,000.

In the eastern waters between Spitzbergen and Novaya Zemlya, the Murman coast and Finmarken, the fishing is carried on from the towns in the north of the country, — in 1897, for instance, with 61 vessels. The capture included, besides seals (about 40,000), more than 400 walruses *(Odobænus rosmarus)*, about 500 polar bears and reindeer from Spitzbergen, and some small species of whale. The aim of the fishery as a whole is to turn to account the abundant animal life of the arctic regions in every possible manner.

The true whale fishery, however, is for the large species of fin-backed whales, especially the Sibbald's whale *(Balænoptera sibbaldii)*, the hump-backed whale *(Megaptera boops)*, the fin-whale *(Balænoptera musculus)*, and the lesser fin-whale *(B. rostrata)*. These are shot from small, extremely sea-worthy steamers, most of them within a distance of 25 miles from the coast of Finmarken. The implement used is the so-called bomb-harpoon, an arrow-shaped iron spear, furnished with a line, which is discharged from a small cannon. The whale often draws the vessels a long way, until it becomes exhausted and dies. It is then towed ashore, and the blubber is removed. This whale-fishery was begun in 1868 by Svend Foyn. While 30 whales were taken in the first year, in 1897 1080 whales were killed by 513 men on 25 steamers, value kr. 1,321,000. At first only the blubber was utilised for train oil; now the bones are crushed for bone manure, and the flesh is used for fodder and manure.

FRESH-WATER FISHERIES.

Of the fresh-water fisheries, the above-mentioned salmon fisheries are the most important. All fresh-water fishing still has quite an original character. There is no regular fish-culture. Most of the lakes are deep, and lie high above the sea, and it is

still an open question whether pisciculture could be carried on successfully.

Next to the salmon, the trout *(Salmo trutta)* and the red char *(Salmo alpinus)* are the most important. They are caught with hook or net for household use, or for sale in the immediate neighbourhood. Further may be mentioned the gwyniad *(Coregonus lavaretus)*, the pike *(Esox lucius)*, the pike-perch *(Lucioperca sandra)*, and the perch *(Perca fluviatilis)*. The profits of these fisheries are no doubt small, but hardly permit of calculation. Eel *(Anguilla vulgaris)* fishing presents the greatest possibility of development, but as yet, little attention has been paid to it.

LEGISLATION AND ADMINISTRATION.

As regards legislation, the country maintains the sole right of Norwegian subjects to the fishing within a territorial boundary line, drawn at a distance of 4 miles from the outermost islands and rocks round the coast. In the great fjords such as Vestfjorden and Varangerfjorden, where the breadth is sometimes as much as 60 miles, the Norwegians maintain the sole right to the fisheries, basing their claim upon the fact that the fishing in those waters has been carried on exclusively by Norwegians for at least a thousand years. The fishing in salt water is in general open to all Norwegians, of course with the restrictions that have been found necessary in the large fisheries for the maintenance of order. Moreover, the right of having fixed appliances is always reserved to the land-owner, while the right to the use of the shore for fishing with movable appliances (lines, nets), is free with certain restrictions, as in some places the ground-owner maintains the right to the fishing, while in others he claims a share in the profits, the so-called «landslod». At the large fisheries this is by no means inconsiderable. For the rest, free fishing is restricted by various protective regulations.

The *administration* of the fisheries falls under the province of the Department of the Interior, where a referee is appointed in fishing matters. For the salt-water fisheries, there are moreover 4 inspectors of fisheries, each in a separate district, while the fresh-water fisheries all over the country are under one inspector.

Investigation of the fisheries (fishing methods) and of Norwegian waters is made by a special, «practical-scientific investigation»; and the fishery interests are watched over by biological stations supported by the state at Drøbak (on the Kristiania Fjord), Bergen and Trondhjem.

In addition to this, the state makes grants to companies of partially private organisation, whose object is of a more local character, most of them being branches of a «company for the promotion of fisheries» with its principal office in Bergen.

There are also annual grants in the telegraph, harbour, and light-house budgets for the advancement of the fisheries, and purely scientific institutions have also received liberal support for the same purpose, e.g. the Norwegian North Atlantic Expedition, which investigated the Norwegian North Atlantic in 1876—78. Professors H. Mohn and G. O. Sars have rendered special service to this expedition, the last-named having also during 30 years conducted fishery investigations, and laid the foundation of most of our knowledge of the Norwegian fisheries.

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HUNTING

THE *elk*, the *reindeer* and the *red deer* are the big game that are hunted in Norway. Among other game used for food, the *hare*, *grouse*, *blackcock*, *capercailzie*, *hazel grouse*, *thrush* and other small birds are snared and shot, as well as a few sea-birds such as *little auks*. Certain beasts of prey are also hunted, such as *bear*, *wolf*, *lynx*, *glutton*, and *fox*, as also *eagle* and *goshawk*. A reward is offered for each of these animals all over the country, and in some places a reward is offered for the extermination of *martens* and *eagle owls*. The *otter* is also common, and an object of chase, as also the *badger*. In connection with hunting may also be mentioned the collecting of *eggs* and *down* on the islands, several of the northern islands being nesting-places, where sea-birds nest in thousands.

On the coast a number of *seals* are killed, and off the coasts *whales* also. (Cf. above page 370).

The hunting of all the above-named eatable animals is pursued partly as a minor means of subsistence by the country people, partly as a sport by towns-people and foreigners; and all the above-named eatable animals are the objects of both kinds of hunting or capture.

Besides guns, traps and snares are used in the capture of these animals, the employment of which it has been attempted to restrict by legislation.

The *elk* occurs commonly in south-eastern Norway, and in the Trondhjem district as far north as southern Helgeland.

The *reindeer*, which frequents the high mountains, is shot principally in the Kristian's and Hedemarken counties, and to

some extent in Hardanger and Voss, and in other counties in the west country. In northern Norway, where the Finns wander about with their large flocks of tame reindeer, the wild reindeer is rapidly disappearing.

The *red deer* occurs chiefly in Hitteren, and in small numbers on the adjacent islands, and also on the mainland near Hitteren.

The number of head of big game shot during 1896 and 1897 is as follows:

	1896	1897	1898
Elk	991	880	902
Reindeer	942	832	951
Red deer	138	147	180

Grouse is without comparison the most important game in the country. The probable number of grouse shot and snared annually in Norway is 1,100,000. A large proportion of these are snared, but shooting grouse over dogs is much practised, and is a favourite sport. It is principally the willow-grouse that is shot, and its distribution is in a great measure dependent upon the birch woods. Certain tracts and islands are well-known as good grouse country, e.g., Hadsel in Vesteraalen.

Shooting *hares, blackcock, capercailzie, hazel grouse, thrushes* and other *small birds* is general, principally in the wooded parts of the country; but the shooting of all these animals together is of less importance than grouse-shooting. While the weight of the grouse shot annually is estimated at about 440 tons *dead weight*, that of the other birds and hares together amounts to 260 tons.

Wild duck, woodcock and a few other birds are also shot, but the results are not great.

In northern Norway, the sea-birds breed in colonies or upon bird-cliffs, where they are found in enormous numbers. They sit in long rows upon the ledges of the cliff, side by side.

The birds that breed upon the bird-rocks, and whose eggs are collected, are the *kittiwake*, the *puffin*, the *little auk*, and the *guillemot*. The *large* and the *small cormorant* also frequent the bird-cliffs. The birds on these cliffs are caught or killed partly for the sake of their feathers, partly for their flesh. Nets are also used in catching them, and sometimes dogs to drag the puffins out of the holes where they sit.

The *eider-duck* is valuable on account of its down. This bird is found along the whole coast, but principally in northern Norway.

It lays from 5 to 8 eggs, and builds its nest partly of down. From each nest, about 1 ounce of eider-down when cleaned is obtained, and a certain number of eggs are also taken from the nests.

There is no exact estimate to be had of the quantity of eggs and down collected in the country; but probably the entire production of sea-birds' eggs throughout the country amounts to about half a million in number, and of eider-down to about 3000 lb.

The number of beasts of prey killed in 1896 and 1897 was as follows:

	1896	1897
Bear	44	39
Wolf	90	112
Lynx	30	53
Glutton	64	48
Fox	13,605	13,642
Eagle	770	678
Hawk	3,999	3,295

Some earlier figures are here given for the sake of comparison. Between the years 1846 and 1860, the *annual average* number of beasts of prey was as follows:

Bear	231
Wolf	222
Lynx	120
Glutton	53
Birds of prey	4269

No reward was offered during these years for foxes.

The number of *bears* has been steadily decreasing with the more general use of better guns.

In the northern districts, the *wolf* is found generally where there are tame reindeer; but for a number of years it seems to have disappeared from large tracts of the country, as if some disease had attacked it. Latterly it has again seemed to be increasing in number.

The *lynx* and the *glutton* are widely distributed, without occurring anywhere in very great numbers.

As the figures show, the *fox* is without comparison the most common beast of prey, and it is hunted partly for its skin, partly

for the price that is put upon its head, and partly to reduce the amount of injury it does to the useful game and in the farmyard.

The number of *eagles* brought down annually is put, as we have seen, at about 700 during the last few years. Some of these are sea-eagles, some ospreys. Among the *goshawks* brought down, there are also some *falcons*; and in olden times, Norway furnished live falcons, that were trained for hunting in Central Europe. The Dutch especially had places in the Norwegian mountains for the capture of falcons.

Hunting without dogs has from ancient times been free in Norway. By a law, which comes into force on the 1st July, 1900, however, all right to the shooting and trapping of animals — with the exception of beasts of prey — is assigned to the land-owner; and the close times are considerably extended. In the «statsalmenninger» (see page 347) hunting is still free to all Norwegians. Foreigners wishing to hunt must take out a special licence.

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MINING

The Norwegian Mining Industry is not very considerable, and it has not advanced during the last generation. The reason of this is that the Norwegian ores, as a rule, are not rich, their extent is not large, and their occurrence is often irregular.

As coal does not occur — except on the out-of-the-way island, Andøen — the conditions are not favourable for a large smelting industry. The number of ores and useful minerals occurring is, on the other hand, considerable, and some of them have been worked for centuries. In the following pages, we shall mention the most important mines in Norway.

The *Kongsberg Silver Mines* are owned by the Norwegian State. The ore here is virgin silver (with sulphuret of silver), occurring in lodes, consisting of calcite, fluor and quarz, these lodes crossing the bed-rock from east to west, while the strata of the rock run from north to south, and are impregnated with sulphur ores. The virgin silver sometimes appears in big nuggets weighing even more than 200 lb. The number of lodes is very great, as also the number of old mines.

The silver-mines of Kongsberg began to be worked in 1624, during the reign of Christian IV, and subsequently the work was usually carried on there with loss, a circumstance which caused the mines to be closed in 1805. The exploitation of the mines was resumed in 1815, and was continued with loss until 1823, when the output during one year exceeded 10 tons of silver, so that the work yielded a surplus of 1.6 million kroner. Since that time, the production has been about 5 tons of fine silver annually,

and from 1815 to 1898, the mines have given a net yield of about 23,000,000 kroner.

The result of the great fall in the price of silver has been that of late years the mines have given no surplus. The total output of the Kongsberg silver-mines up to the year 1898 has been as follows:

Year	Tons of Silver	Gross Value
1624 to 1815	553	88.7 million kr.
1816 - 1898	345	52.8 — »
Total, 1624 to 1898:	898	141.5 million kr.

The silver ore produced at the Kongsberg silver-mines is sorted and treated on rollers and separators, while the finest goods are refined on hearths.

The virgin silver is burnt fine, while the schlichs are melted with pyrites, and after roasting and repeated melting mixed with lead, whereupon the furnace lead is cupelled, the result being fine silver of 998 per mille fineness.

Some mining for silver has also taken place in the districts round Kongsberg, on fields that have been left for private exploitation; and the same has been the case at Svenningdalen in Vefsen (Nordland), where the mines have been worked for fahlerz and galena containing silver, with an output during the years from 1876 to 1896, representing a value of 1½ million kroner.

The oldest *copper mines* in the country are those of *Røros*. These mines were started in 1646, and the most important ones are Storvatsgrube, Kongens Grube with Arvedals Grube, and the Muggrube. The ore is copper pyrites at the Kongens and Arvedals mines, and in other places cupriferous iron pyrites, of which a great quantity is exported.

The working of the Røros copper mines has of late years been extended. There is a new electrical establishment worked by water-power, by which the power is transferred to the mines, and distributed for various purposes.

The copper ore that is smelted, as a rule contains rather more than 5 % of copper; it is roasted and melted in water-jacketed furnaces, whereby a first matte is produced, containing 37 % of copper. By the Manhès Bessemer process this matte is concentrated to a concentration matte, containing 78 % of copper, and this again by the Bessemer process into Bessemer copper (99.5 %) which is refined.

The Røros copper-mines used to produce from 600 to 700 tons of copper, and about 20,000 tons of pyrites for export, but with the new works, the production will be considerably increased.

From 1646 to 1897 the Røros copper-mines have produced 73,000 tons of copper, and from 1880 to 1897 about 260,000 tons of pyrites for export, the aggregate value being 133 million kroner, of which the pyrites exported represents 4½ million. The net yield may be estimated at 36,000,000 kroner for all these years taken together. The mines are owned by a Norwegian joint-stock company.

The Sulitjelma copper-mines, in Salten in Nordland, are worked for the same ores as the Røros mines. They produce partly copper and partly pyrites for export. They were not opened for exploitation until 1887, yet in 1897 they employed from 600 to 700 men, and the annual output is about 30,000 tons of pyrites for export, while the smelting ore yields about 350 tons of copper.

At the mines, which are worked by a Swedish joint-stock company, there are several considerable lodes of cupriferous iron pyrites, and the output will probably be considerably increased.

The *Aamdal copper-mines* in Telemarken produce copper pyrites, which is dressed and exported. The mines are old, and have been worked partly by Norwegians and partly by Englishmen.

During the years 1876 to 1897, the output of copper-ore has yielded a total of 5,700 tons of copper.

Besides the copper-mines here mentioned, there have been a considerable number of old mines that are now closed, such as Meraker or Selbu copper-mines in Meraker, Løkken copper-mines in Orkedalen, Dragset in Meldalen, Boilestad mines in Froland.

Some mines have been worked partly for cupriferous iron pyrites and partly for pyrites for export.

The most important of these were the *Vigsnes* mines, which were worked by a Belgian-French company from 1865 to 1894, with a total output of about 900,000 tons. The works were closed in 1894, when the mines had reached a depth of 2410 feet.

Other important, partly cupriferous, pyrites mines have been worked at the Ytterø works on the Trondhjem Fjord, and Valahei mines on the Hardanger Fjord.

Important ores of pyrites occur at the Foldal mines in Foldalen, and in the Undal mines, but it has hitherto been impossible

to work these mines for export, as they are situated in the interior of the country at too great a distance from railway stations.

Iron ores occur in many places in Norway, and the country previously had a considerable number of old, but unimportant iron works such as Bærum, Moss, Hakkedalen, Eidsvold, Hassel, Eidsfos, Fritzø, Hollen, Bolvik, Egeland, Froland and others.

The result of the rising price of charcoal and the condition of the forests, which did not permit any great increase of the coal production and the whole working of the ores, was that these works were closed about the sixties. The sole exception to this was the Nes iron works near Tvedestrand, which get their ore from the Klodeberg mine near Arendal. The Norwegian iron produced from the ore from the Arendal mines is noted for its good quality. Some iron fields in Nordland and Telemarken could be made to yield considerable quantities of iron ore, if they were connected by rail with some port.

A number of *nickel* mines have been worked for magnetic pyrites containing nickel; the working of these mines commenced towards the end of the forties, at Ringerike and Espedalen. Afterwards several nickel-works were established, such as Bamle, Evje, Sigdal, Askim, Senjen, Skjækerdalen, where the ore, as a rule containing 2 % of nickel, was smelted.

These nickel works were flourishing during the years 1870—1880, when prices were high on account of the small supply of, and the great demand for this metal, for small coins. At the present time these nickel works are not being worked, but the ores sometimes occur in great quantities.

The Modum *cobalt* mines were first worked in 1772, and were worked up to the year 1898, when they were closed. They were owned by a Saxon company. The most important ore at the Modum cobalt mines was cobaltite, which was dressed.

Chromite occurs in several places in serpentine, the most important ores occurring in the vicinity of Røros.

Zinc-blende has been extracted from the Birkeland mine in Saude, and *galena* at the Konnerud or Jarlsberg mines in Skoger near Drammen.

A little *rutile* and *molybdena* is produced. *Thorite,* containing the rare mineral thorium, is found in scattered lodes, from Langesund towards Arendal. Some years ago it fetched a very high

price, and the total production may have been worth about kr. 1,000,000.

The following table is a summary of the mining industry during the years 1896 and 1897.

Mining in Norway	Quantities produced		Value of Production		Number of hands employed	
	1896	1897	1896	1897	1896	1897
	Tons	Tons	Kr.	Kr.		
Silver and silver ore	527	760	400,000	464,000	225	225
Gold			35,000	2,500	93	191
Copper ore	29,910	27,606	1,136,100	1,144,100	1,303	1,133
Pyrites, partly cupriferous	60,507	94,484	970,000	1,445,000	248	519
Nickel ore					3	
Cobalt schlichs	29	24	10,000	10,000	40	30
Iron ore	2,000	3,627	14,000	21,000	8	150
Zinc ore	450	908	13,500	27,000	52	168
Molybdena	4	2	6,000	3,000	15	9
Rutile	30	32	36,000	20,000		9
Total	93,457	127,443	2,620,600	3,136,600	1,987	2,434

To this must be added the production of feldspar, apatite and other useful minerals, and hewn stone. The export value of hewn stone in 1898 was kr. 2,023,000, while the average for the years 1891—95 was kr. 852,000. The corresponding figures for feldspar were respectively kr. 181,700 and 136,800, and for apatite 197,600 and 170,700.

Mining for apatite is carried on in the county of Bratsberg. The industry was of no importance until 1872, when rich lodes of apatite were found near Odegaard, the result being the establishment of large works employing up to 800 men. The production has reached 17,000 tons of the value of 2 million kroner. Some mines have been worked by Frenchmen and others by Norwegians, but the industry has of late years been considerably reduced.

Feldspar, which occurs in coarse-grained lodes together with mica and quartz, is mined at different places in the county of Smaalenene, and in the coast region from Bamle to Arendal. The output as a rule varies between 6000 and 12,000 tons.

Some quartz and mica is produced together with the feldspar.

Soapstone is quarried in several places round Trondhjem and in Gudbrandsdalen, and the Cathedral of Trondhjem has been its chief consumer. It seems as if the employment of soapstone for building purposes is becoming more common, and this kind of stone appears in some places in considerable quantities.

Roofing-slate is produced in Valdres where the slate is of a pretty green colour, in Voss, Stjordalen, in Gudbrandsdalen and in several other places.

From early ages, millstones have been produced at Selbu.

Whetstone has also been quarried from time immemorial at Eidsborg in Telemarken.

Hewn stone has been produced in Norway in increasing quantities. The kinds of stones that are quarried are granite, syenite, augite-syenite, gabbro and porphyry.

The most important quarries are situated near Fredrikshald, Fredrikstad, Larvik and Drammen.

Limestone is quarried in several places, and considerable quarries of it are found in the silurian strata round Kristiania. Very rich strata of marble occur in several places, chiefly in Nordland, in Salten near Fauske. In the last-named place the quarries are worked on a relatively large scale. The marble is chiefly exported to Copenhagen. The Norwegian marble is partly calcite marble and partly dolomite marble. It is white, bluish white or grayish white, and it also occurs with red and black shadings. There are close and coarse-grained varieties and it takes a glassy polish.

The dolomite marble is sometimes brittle. The layers occurring at Fauske are some six hundred feet thick and can be followed for about ten miles. The output is therefore dependent only on the demand

Many minerals containing rare metals and earths occur in Norway, for instance round the Langesund Fjord and Arendal. These minerals are highly treasured in scientific collections, and rare specimens from Fredriksvern, Brevik, Arendal and other places are found in almost all collections of minerals.

INDUSTRY

I. GENERAL SYNOPSIS.

Next to agriculture, industry is the livelihood that is of the greatest importance to the Norwegian people, considered with reference to the number of people for whom it provides a living. According to the latest census (1891) out of the total population of Norway, — 2,004,000 individuals, — about 462,000, that is to say 23 %, were directly or indirectly connected with industry (inclusive of some kindred trades like mining, making of highways and railroads). For the sake of comparison, we may mention that out of the population of Sweden almost exactly the same percentage, that is to say 22.7 %, were connected with industry, while in Denmark 28.6 % of the population were thus engaged. In France 26 % of the population are engaged in industry, in Austria the same percentage, while in the German Empire (1895) 39 %, and in Switzerland (1888) 40 % are similarly engaged.

The industrial population of Norway has been steadily growing of late, a circumstance which is apparent from the fact that in 1876 it numbered only 353,000 individuals, that is to say 19 % of the aggregate population, and in 1865 about 250,000 (about 15 %). The growth of the Norwegian industry, at any rate of the manufacturing industry, is, however, still more pronounced, if we look at it with reference to the production. In the sixties this was still of little importance, but during the last generation has grown considerably in a number of branches. It is to be regretted that there are no statistics available with reference to the total production, but the statistics of our exports show that the progress has

been very great. Our export of industrial products has gone up from about 1½ million kroner annually in 1866—67 to 45 million kroner as an average for the years 1896—98 *). (The export value of all kinds of timber and fish-oil has risen during the same period from 34½ million kroner to nearly 45½ million kroner). Norwegian industry has also made important progress as regards the quality of the products.

According to the latest census, the total number of persons who made their living by industrial occupations, were divided in the following manner among the chief branches of industry, and according to their social position and personal circumstances.

	Persons engaged in industry on their own account		Officials, clerks, foremen, etc.		Workers employed		Total	Aggregate number of individuals, inclusive of dependent family and servants.
	Men	Women	Men	Women	Men	Women		
Manufacturing industries . .	1,080	63	3,782	153	36,327	7,873	49,278	Abt. 140,000
Handicraft . . .	31,166	1,567	576	98	39,424	2,662	75,493	» 200,000
Minor industries	2,688	28,097	57	51	4,208	9,907	45,008	» 65,000
Total	34,934	29,727	4,415	302	79,959	20,442	169,779	Abt. 405,000

Among the afore-mentioned workers there were 1885 children under fifteen years of age, among them 1,055 engaged in manufacturing industries (770 boys and 285 girls), 600 in artisan industries (579 boys and 21 girls), 230 in sewing and other minor industries (160 girls and 70 boys).

II. THE DEVELOPMENT OF INDUSTRY.

A. HANDICRAFT, MINOR INDUSTRIES AND DOMESTIC INDUSTRIES.

The industries carried on in the homes and by artisans in Norway existed long before the kingdom was united under King

*) In 1896, 44.5; in 1897, 50.4; in 1898, 41.6; see also Article »Commerce and Shipping.«

HARALD HAARFAGRE in 872. There could, however, be no artisan-class before the town-life developed in the eleventh and twelfth centuries. But the art of making clothes as well as farm implements, and the art of manufacturing (or at least repairing) arms were generally known among the people, and on every farm the inhabitants, as a rule, were able to help themselves. Individuals who had acquired a greater proficiency than their neighbours, also worked for others. Skill in building houses and ships, in wood-carving, and especially in making weapons was held in special esteem. It seems, however, that after the close of the Viking age, the art of making weapons fell into decay among the people generally, and as a national art. — It was the pride of the women of that time, as of the present day, to be able to embroider with taste. — The national homespun cloth was the material most used by the people in the middle ages, as it is still. The well-to-do classes, however, used a good deal of foreign, especially English and Flemish, cloth.

From the thirteenth century we have interesting information about the condition of handicraft in the most important town of the country at that time, Bergen. The laws of that time mention a number of different kinds of artisans, such as shoe-makers, furriers, goldsmiths, comb-cutters, painters, saddlers, tailors, cuirass-makers, sword-grinders, joiners, coopers, millers and others, to whom certain quarters and lanes of the town were assigned, where they might carry on their different trades. A large proportion of these artisans, who seem to have been very numerous, had immigrated from Germany; and the number of these immigrants increased much during the 14th and 15th centuries, as the power of the Hanse steadily grew, at the expense of the Norwegians, who, it would naturally be supposed, originally formed the major part of the artisans in Bergen, as well as in other towns of Norway.

Simultaneously with the invasion of the foreigners into the trades of our towns, the artisan skill of the Norwegians also decreased, especially after the middle of the 14th century. It may be considered as a turning-point for the better as regards the nation, when in the years 1557 to 1559, CHRISTOPHER WALKENDORF, the energetic Seignior of Bergen, succeeded in breaking the power of the Hanseatic artisans of that town, whereafter the larger part of them left the town and were replaced by others who, although largely of foreign extraction, at any rate became Norwegian citizens.

The corporate system has been for centuries of the greatest importance to handicraft in Norway, as well as in other civilised countries. As early as the 13th century, we find in our country guilds of artisans, which, however, about the close of the century, were suppressed by the state. Afterwards the Hanseatic artisans introduced their corporate organisation into Norway, but when in the 16th century, as already mentioned, many of them left Bergen, the corporations, properly speaking, ceased to exist there for a time. It seems, indeed, as if the different artisans united in a kind of corporate association resembling the guilds; but towards the close of the 16th century, a great freedom of trade was prevalent, partly with unhappy results: «Everything is pell-mell and upside down,» says a contemporary writer. «The tailors go fishing salmon, the barbers are beer-house-keepers and merchants», etc. A decided change in this matter was caused by the decree of 1621 relating to artisans, journeymen and apprentices, by which the corporate organisation was firmly and exclusively established; and this organisation formed the basis of the position of handicraft, until the act of 1839 again introduced more liberal principles. Under the corporate system every kind of artisan had a monopoly within their own line, to which, on the other hand, they were restricted. It was especially forbidden in any manner to combine a citizenship as merchant and artisan. In order to become a master artisan it was necessary to have been apprenticed for a certain number of years, and thereafter to have been a journeyman for a certain length of time; and in addition to this it was necessary to stand a master's test. It may be mentioned that in 1839 all artisans were not organised in corporations, but chiefly those embracing the most important trades and working in the old towns; thus in Bergen there were 14 corporations, in Kristiania 6, etc., 46 corporations in all. In conformity with the provisions of the act of 1839, the corporations have gradually ceased to exist, and access to the different trades of artisans is now, also by virtue of the additional law passed in 1866, as a general rule open to every man and woman of the age, and fulfilling the requirements for obtaining citizenship in a town. In 1894, however, the important provision was introduced, that in order to obtain citizenship as an artisan, either the tradesman himself, or the person managing his business, must have done a probation work. The act of 1839 had done away with the necessity of examinations outside the corporations,

and only required a certificate of ability from two reliable men as a necessary condition for obtaining such citizenship. This too easy access was partly the cause of several abuses, for which reason the new law has been received with great satisfaction by the artisan class. Combination of citizenship as artisan and as merchant has been permitted since 1866. Since the same year, permission has been given to anybody to carry on trade as an artisan without citizenship, provided the work is done without hired help.

In the country districts freedom to work was formerly granted only to the most necessary artisans, e.g. tailors, shoe-makers, blacksmiths and carpenters. Other trades, such as tanning, dyeing, etc., could only be carried on by special permission. The products of the country artisanship were not allowed to be introduced into the towns, or exported abroad. By the act of 1839, the carrying on of trade as an artisan was made free in the country districts, but work could not be done for townspeople except at a distance of seven miles or more from the town in question; this distance has afterwards been shortened, and since 1876 the carrying on of handicraft as a trade in the country districts has been made entirely free.

The artisan skill and energy of Norwegian workmen, even as late as the 18th century, was on the whole not very great. In the thirties of this century the matter was considerably improved, and about the middle of the century handicraft in our towns, especially in the larger ones, was steadily progressing.

The freedom of trade which has been extended, especially since 1866, caused the artisans considerable difficulty, which they seem, however, to have surmounted in a creditable manner, having been able to maintain their position as an independent class of society. Other circumstances, such as the depressed economic conditions towards the close of the seventies and during the eighties, and also, in a very considerable degree, the labour question, have exerted a hampering influence on the development of handicraft, especially in Kristiania. But on the whole, Norwegian handicraft has also of late been progressing in quality as well as in financial strength; wages also, have much increased.

In the country districts, handicraft on the whole is considerably behind that in the towns, which is a necessary consequence of the thin population, and the fewer opportunities of receiving a professional education. As a general rule, the work is only intended to meet the local demand, but in not a few places,

different kinds of artisan work or of domestic or minor industry, are now, as in previous decades, carried on intended for sale outside the district, such as joiner's or cabinet work, and other woodwork, the manufacture of woven goods, tin-ware and also iron goods. Boat-building also plays an important part in the coast districts.

Domestic industry, fifthy years ago, was more extensively carried on than now. In an official report from the middle of the century relating to the economic condition of the country, we read: «In most districts of the country, the women make whatever is necessary of linen, cotton and woollen goods for the clothes of the family, and the men manufacture the necessary farm implements. In several districts some products of domestic industry are prepared for sale, such as canvas, homespun cloth and to some extent, finer linens.» Domestic industry was at that time mostly progressing, but in some places it was decreasing, because it was found cheaper to buy foreign clothes than to make them at home. — The easy and cheap means of procuring necessities by buying products of domestic or foreign manufacture, partly in connection with other causes, has exerted, since the middle of the century, a rather restrictive influence on domestic industry, and to some extent caused a noticeable decline. On the other hand, several districts report progress in domestic industry; and of late years increasing interest has been shown, and efforts made for its advancement, by means of schools for domestic industry, exhibitions and places for the sale of the various products. «The Norwegian Domestic Industry Association» (founded in 1891) has now a richly-assorted and well-furnished shop in Kristiania. The most interesting products of home industry in the country districts are the well-known national carvings, sheath-knives, several kinds of household goods, ski, sledges, etc. Among the products of female domestic industry may be mentioned sewn and embroidered goods, in which the old Norwegian patterns prevail, and woven goods of wool and cotton, knitted goods, etc. Of late especially, the interest for the old national fine weaving has been greatly increased.

B. THE HISTORY OF FACTORY INDUSTRY.

The development of the factory industry in Norway chiefly belongs to the 19th century, although we also have examples of industrial activity during the earlier centuries. Thus one branch

of modern factory industry, the saw-mill industry, dates as far back as to about the year 1500. It was only about fifty years later, however, that this industry attained any importance in our country. There are also traces of other establishments, but it is only about the year 1700 that a manufacturing industry, properly so called, can be said to have commenced. At about that time, the first paper-mill and the first oil-mill were established in the country, and somewhat later the first groats-mill came into existence. The Danish-Norwegian government during the succeeding period was anxious to advance the development of national industry, but the means employed by it for that purpose, during those brightest days of mercantilism, consisted chiefly in exclusive privileges, prohibition of importation, and high protective duties, and did not lead to the result desired. The king also personally participated in the industrial activity; thus in the year 1739, the salt-works at Vallo were established for the account of the government; and in the year 1775, the government bought from the Norwegian or Black Company, which had been in existence since 1739, the glass-works that this company had established. But the movement was still unsuccessful. Several important branches of industry altogether succumbed. As regards metal industry, the production was limited to some plain, rough iron-ware and nails; and the textile industry was almost exclusively represented by the spinning and weaving industry that was carried on in the state-prisons and houses of correction (rough woollen and linen goods). Towards the end of the century, some rope-walks, paper-mills, tobacco-factories, brick-fields, powder-mills and some other scattered establishments deserving the name of factories were found in the country, while the chief bulk of industrial establishments consisted of small saw-mills, flour-mills, etc., which, as a rule, worked only for the local consumption, and were scattered over the whole country, and could only in a limited sense be considered as representatives of manufacturing industry.

During the last quarter of the last century, when the conditions were very favourable for commerce and shipping, it seems as if industry were entirely overshadowed, and no important improvement took place within the first decades of the 19th century. In 1835, the statistics show 4219 industrial establishments, but out of these 3398 were saw-mills. Of the remainder, 366 were distilleries, the rise of which dates back to the year 1816, 193

brick-fields, 79 tobacco-factories, 61 malt-mills, 29 rope-walks, etc., and almost all these works were carried on in an artisan way. The textile industry was still almost exclusively carried on in the houses of correction, where machine power was unknown, and there was not a single machine factory. In the forties, however, good progress was made, so that the important branches of textile and metal manufacturing commenced to attain a certain prominence at the very beginning of the second half of the century. Most vigorous, however, was the growth of industry during the years 1865 to 1875, when several new branches of industry, some of which were afterwards to play a more prominent part in our export, were awakened to new life or appeared for the first time. Thus the match-factories, which in 1850 employed 30 labourers, in 1875 gave employment to 1293 individuals, and the breweries, which, about the middle of the century employed only 175 men, had grown in 1875 to employ 1407 men, partly in consequence of the very pronounced decrease in the distillation of liquor, due to a change of legislation which took place after the year 1845. During this period, the production of nails and horse-shoe nails for export purposes commenced to attain a certain prominence: but a new branch of industry which appeared in the country in the sixties viz. the production of wood pulp, was of much greater importance for the future economic and industrial development of the country than the above-mentioned branches. The first wood-pulp mill in Norway was established in 1863, and was calculated to supply what was required for home consumption only; and it was only in 1868 that the first pulp-mill for exporting purposes was established. In addition to this, we shall only mention the development which the saw-mill industry had on account of the complete repeal of the old saw-mill privileges, and the development due to the introduction of planing-machines. At the same time several of those branches of industry which, up to that time, had been chiefly carried on by individual artisans, such as rope production, tanning, brick-making, etc., underwent a development in the direction of a consolidation and the use of machinery in the production.

The second half of the seventies was a period of industrial decline, which the following five years were only able to neutralise. During the years 1886—90, on the other hand, the development was favourable, but this period was followed by a period of stag-

nation until 1896, when the improved condition of the world's markets again aroused international production to new life. In 1897, something occurred which may turn out to be of considerable importance for the industrial development of Norway, viz. that the commercial treaty between Norway and Sweden, which, with different modifications, had been in force throughout the union of the two countries, ceased to exist, having been denounced by Sweden. The common industrial market was thus dissolved, and mutually prohibitive tariff rates took its place, whereby a sudden and very strong industrial activity was caused in Norway, assisted by good times for commerce and shipping, and an unusual activity in our foreign markets. Our country has now a number of large manufacturing establishments provided with up-to-date machinery, and this is especially the case in the wood manufactures, and in the machine industry, but also in other branches of industry.

The rather considerable rainfall, and the peculiar topographical structure of the country with its wide mountain plateaus and the step-formation in the valleys have supplied Norway with superabundant natural motive power in the waterfalls, of which there is a greater abundance than in any other land. A large number of these falls, representing millions of horse-power, are conveniently situated, and ought to ensure a continually increasing development of the industries of the country, especially in those branches of manufacture where a very strong motive power is needed. A flourishing industry for exporting purposes on the other hand, is hampered by the poverty of the country as far as raw materials are concerned, by its rough climate and by the relatively high wages, and the defective industrial education of the labouring population, etc.

The total number of manufactories in Norway at the end of the year 1895, was 1910, employing in the aggregate 59,800 individuals (inclusive of officials and clerks). This number has been considerably increased since that time, and can now be estimated at about 70,000 persons. In the year 1850, the aggregate number was 12,700.

In those branches of industry that are subject to factory inspection (inclusive of mines, etc.), there were employed in 1896 3484 motors, representing a total of 127,000 horse power; in 1898 the horse power had been increased to 157,300, of which 110,400 was produced by hydraulic power, 44,800 by steam, and 2100 in other ways.

During the last few years, an energetic commencement has been made of the use of electric motive-power, partly on the basis of steam, but far more by the transmission of power through turbines at the waterfalls. Several town corporations have bought up the waterfalls in their neighbourhood, and have begun to erect in some cases considerable works for the production not only of electric light (and in the case of the larger towns, electric tramways), but also motive power for both small and large industries.

III. BRANCHES OF INDUSTRY. LOCAL DISTRIBUTION.

A. MANUFACTURING (FACTORY) INDUSTRY.

We reproduce here from the official factory statistics for the year 1895 some information bearing upon the importance of the different branches of industry and their local distribution over the country. It should, however, be noted that a considerable number of factories have been established since that time, but that as regards these, we have not sufficiently complete statistical data to enable us to take them into consideration.

For the branches of industry that play the most important part in Norway, see the following table:

Branches of Industry	Establishments	Work people.	Days' work (in thousands)
Wooden ware	383	12,073	2,698.9
Machines, etc.	191	9,318	2,530.9
Textiles	167	8,805	2,477.4
Paper, leather, and india rubber	196	7,720	2,099.2
Food and beverages	496	7,306	1,782.3
Earth and stone	143	5,244	1,035.1
Metals	78	3,308	913.7
Chemicals	62	2,307	565.8

As the best standard for the relative importance of the different branches we have here selected the number of days' work performed in each branch in 1895.

The production of *timber* and *wooden ware*, besides being the largest, is also the oldest branch, and one of those which, as regards up-to-date machinery and quality of the product, are in

the first rank. This is especially the case with the most important branches under this head, viz. the saw and planing mill industry, which was represented by 309 establishments, and had more than 82 per cent of the day's work belonging to the branch. This industry is represented in all the counties of the country excepting the two northernmost. It is most largely represented along the large rivers that allow of the floating of timber. The timber establishments are of special importance in the counties of Smaalenene and Akershus, and particularly in and around the town of Fredrikstad, they are altogether predominant with several large planing and saw-mills working for export. They are also important in the counties of Buskerud and Jarlsberg-Larvik, and in the diocese of Trondhjem there are some rather important establishments in this branch of industry.

In the *machinery industry*, which has only come to be of any importance in Norway during the last fifty years, we still have a good deal to learn from the old industrial countries, although several of the establishments of this kind, e.g. several of the large mechanical work-shops and iron ship-building works, which make up the chief parts of the group (1,985,300 days' work) have gained a reputation for good, solid work, and have exhibited with honour at several of the international exhibitions. The most important establishments of this kind are in Kristiania, among them the largest one in the country, the Nyland mechanical works (822 work-people); there are also several important machine work-shops at Fredrikstad, Bergen, Trondhjem, etc. On account of the development of steam shipping, the ship-building works intended for wooden ships, belonging to this branch, have of late years lost must of their importance, and in the year 1895 had only 1148 workmen, as compared with 5741 in 1875. To this group also belong 22 carriage manufactories, 2 railway-carriage factories, etc.

Unlike the machine industry, the *textile industry* belongs to a greater extent to the country districts than to the towns, as regards the situation, although several of the more important establishments have been founded on the country territory in the immediate vicinity of towns. Among these are the Nydalen spinning and weaving mills near Kristiania (1000 workmen, inclusive of clerks, etc.), in the year 1895 the largest factory in the kingdom. The spinning and weaving mills, numbering 64, with 1,779,100 days' work, occupy a prominent position in this group; and next

to them come the 16 jersey factories and 37 roperies. These last-mentioned factories are chiefly found in the western part of the country, especially at Bergen; the other branches of textile industry are especially carried on in and near Kristiania and in Southern Bergenhus county.

The next group, *the paper, leather, and india rubber industries* owe their important position among our industries to the production of wood-pulp, which commenced in the sixties, and to the development of the paper industry, with which it was connected. In 1895, the kingdom had 15 cellulose factories, 56 pulp-mills and 13 paper-mills, representing together about 81 % of the days' work belonging to the group. The chemical wood-pulp (cellulose) is mostly produced in Smaalenene, where probably the largest manufacturing establishment of the country at the present time, Borregaard Cellulose Factory, is situated, and in the counties of Buskerud and Bratsberg, where the mechanical wood-pulp is of the greatest importance. Of other establishments we may note 87 tanneries, most of them small, scattered all over the country and a few factories intended for the paper industry.

Among the manufactories intended for the production of *food products and beverages*, etc., we must in the first place note 252 flour-mills, most of them small. On the other hand, 44 breweries and 40 tobacco-factories, which chiefly belong to the towns and are especially largely represented in Kristiania, have each more days' work than the whole flour-mill industry. The tinning industry is of particular importance at Stavanger, but is also represented in Smaalenene, Hedemarken, etc. Among these factories we have also reckoned the milk-condensing factories, which work chiefly for export.

Under the head of *the working up of earth and stone*, the 91 brick-kilns, 6 glass-works, 11 potteries and china factories and 17 lime-kilns play the most important part. About one half of the day's work performed at the brick-kilns falls to the share of the counties of Smaalenene and Akershus; 5 of the glass-works are situated near the Kristiania Fjord, and one in the western part of the country. At Ekersund there is a fairly large faience factory, and at Porsgrund a rather large china factory. When we finally mention a cement-mill situated near the Kristiania Fjord, we have accounted for the most important establishments of this class.

In the *metal industry*, the chief establishments are: 4 horse-shoe-nail factories situated near Kristiania, working largely for ex-

port, 7 nail and rolling mills and iron and steel wire factories, and 14 iron-foundries. We may also mention iron and steel works in the county of Nedenes. Furthermore, there are some gold and silver manufacturing businesses in the larger towns and also, especially in the capital of the country, some factories for various metal articles (ladders, scales, locks, etc.).

The *chemical industry* in Norway, when we leave the match-factories out of account, is very poorly developed, inasmuch as only the manure-factories connected with the fisheries and mostly situated in the northernmost counties, and the whaling establishments in Finmarken, are of any importance. The match-factories, of which there are 8, represent more than one-half of the days' work in this branch. These establishments especially produce sulphur matches intended for export to transmarine markets, but on account of the keen competition they have a very hard struggle for existence. It may be expected, however, that in the near future, this group will be of far greater importance to Norwegian industry, inasmuch as at the present time several large establishments are being founded, or are already working, intended for the production of calcium carbids. This branch of industry, which requires much and cheap motive power, seems to be especially adapted for the conditions of our country.

As regards the manufacture of *articles of dress*, which is chiefly concentrated in the towns, the mantle, shoe, and hat factories are of the greatest importance. In 1895, this branch employed 1943 hands (523,800 days' work).

The remaining three groups (the production of articles intended for heating and lighting purposes, oils, etc., graphic industry and sundry other businesses) are of little importance. Among the most important coming under this head we may mention 11 gas-works in the towns and 30 fish-oil refineries, nearly all the latter being situated in the diocese of Tromsø, where the most important cod-fisheries are carried on.

For the whole country, there were on an average about 31 work-people (inclusive of other functionaries) employed in every factory. 1236 factories, that is to say 65 % of the whole number, had a working staff of less than 21 persons; of the remainder, 547 had between 21 and 100, 77 between 101 and 200, 17 between 201 and 300, 17 between 301 and 500, and 6 had more than 500 workmen.

In 1895, about the same number of factory hands were living in the country districts as in the towns, although the number of factories located in the latter was smaller. On the other hand the towns had a larger number of days' work (7.8 million compared with 7.2). As a matter of fact, however, the preponderance of the towns in this respect is considerably larger, because a great number of factories located on country territory in the immediate vicinity of towns, owe their development to the latter, and are owned by inhabitants of the towns. The reason why our manufacturing industry has not concentrated itself more than it has hitherto done about the towns, lies in the necessity which it is under of utilising the water-falls, which furnish it with one of its chief motive powers.

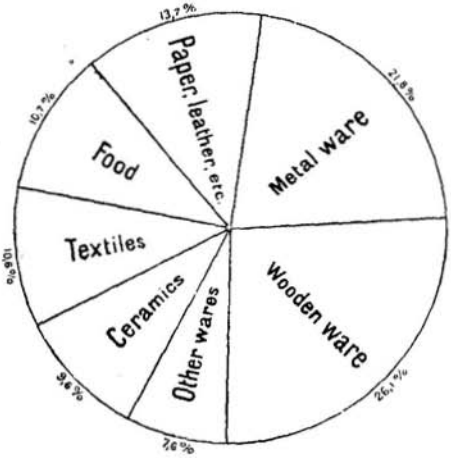
Kristiania, Smaalenene, Akershus, Buskerud and Southern Bergenhus are the counties which show the greatest industrial activity, while factory industry in the three northernmost counties, and especially in Northern Bergenhus, hardly plays any part as a livelihood. In the year 1895, the first three counties mentioned above, had as their share more than half the total number of days' work. Of greater interest, however, than the administrative distribution is the distribution according to natural centres of industry. For the most important of these, cf. the following table:

Towns	Factories	Work-people	Days' work (in thousands)
Kristiania	352	19,048	5,197.3
Bergen	115	4,924	1,347.7
Fredrikstad & Sarpsborg	61	5,409	1,300.7
Drammen	109	3,140	746.4
Skien & Porsgrund	46	2,004	542.9
Trondhjem	57	1,794	489.7
Fredrikshald	35	1,799	451.3
Stavanger	70	1,412	340.6

For the two first-mentioned industrial districts, the machine and textile industries are of chief importance, while the districts of Fredrikstad and Drammen are centres of the sawing and planing industry, the last-mentioned district and that of Skien being also centres of the wood-pulp and paper industries. At Trondhjem, the machine

branch represents about 40 % of the days' work, while Stavanger has its speciality in the tinning of food-products. Outside the industrial centres mentioned here, the factories mostly group themselves around Skedsmo (Lillestrom), Larvik, Kristiansand and Arendal. The aggregate number of establishments in all the above-mentioned districts in the year 1895 represented about 50 % of the entire number of establishments in the country, while the number of days' work in the same was about 75 % of the whole number.

The following diagram shows the distribution of industrial activity between south-eastern Norway (i. e. Kristiania and the counties Smaalenene, Akershus, Hedemarken, Kristians, Buskerud, Jarlsberg-Larvik and Bratsberg) and north-western Norway (i. e. Bergen and the remaining counties).



South-eastern Norway.

North-western Norway.

B. INDUSTRY AS CARRIED ON BY INDIVIDUAL ARTISANS.

Of the various kinds of artisans, the most numerous according to the census of 1891, were:

a. Among the independent artisans:

1.	Shoemakers	8582	of whom	in	the	country districts	6635
2.	Joiners	5444	- —	-	»	— —	4267
3.	Tailors	4577	- —	-	»	— —	3650
4.	Smiths	2620	- —	-	»	— —	2154

5.	Painters	1561, of whom in the country districts	929
6.	Carpenters, builders, etc.	1533	1180
7.	Bakers	1194	498
8.	Masons and bricklayers	912	570
9.	Coopers	798	545
10.	Butchers	735	271

b. Among the wage-earners (exclusive of children under 15 years):

1.	Carpenters	5998, of whom in the country districts	4156
2.	Shoemakers	5998	2885
3.	Joiners	4276	2009
4.	Masons	4106	1666
5.	Tailors	3828	1842
6.	Smiths	2409	1232
7.	Bakers	2399	615
8.	Painters	2074	551
9.	Printers	1425	98
10.	Coopers	1029	301

Of all the persons occupied in handicraft, that are above 15 years of age (74,893 in all), about half (35,038) were living in the towns.

C. MINOR INDUSTRIES (AND DOMESTIC INDUSTRY).

Of the women of more than 15 years of age (28,097 in all) engaged in independent minor and domestic industries, 12,794 were engaged in *sewing* (about one-third of them in the towns), 7,455 in *weaving and spinning* (the greater number of them, viz. 94 %, in the country districts, especially in the diocese of Hamar and in the western and northern coast counties), 1952 in *knitting*, 3758 in *laundry work*, chiefly in the towns. Among 2688 men engaged in minor industries on their own account, 977 were workers in *wooden goods*, etc. (284 of these were living in the country districts); 548 were *boat-builders*, almost exclusively in the country (chiefly in the counties of Nordland, Southern Bergenhus, Nedenes and Romsdal); 248 were engaged in *making seines and fishing nets*, 237 made *fur bed-covers*, etc. Further, 9747 women (5613 seamstresses and 2435 laundresses, etc.) and 4138 men are accounted

for as working in minor industries for others; of these men, more than half were stone-workers.

It should be noted that these figures only indicate those who are engaged in minor and domestic industries as their chief livelihood. But this livelihood is also, to a considerable extent, carried on as an accessory trade, especially in the country districts.

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COMMERCE AND SHIPPING

I. GENERAL SYNOPSIS.

THE geographical position and physical condition of Norway and the natural disposition of the Norwegian people, have always caused their intercourse with other nations, through commerce and shipping, to be of the greatest importance to the country, both as regards the economic and industrial life of the people and the whole national and cultural development.

Our country has by nature been poorly endowed in some respects, but in others richly. It is only a relatively small part of the surface of the country that is fitted for agriculture, and not many districts produce enough for the maintenance of their inhabitants. The importation of cereals, therefore, has always been a necessity. On the other hand, the Norwegian people possess great sources of wealth in the sea-fisheries and in the extensive forests of the country. The long coast-line, with its many well-protected harbours, renders shipping a livelihood especially adapted for our country; and the Norwegians have at all times excelled in their inclination and ability for this occupation. The Norwegians have also the reputation of possessing some capacity for commerce, and our foreign trade, even a thousand years ago, was already relatively of considerable importance. Our commerce and shipping, however, after having for several centuries, to a great extent, been carried on by the Norwegians themselves, fell gradually, ever since the fourteenth century, more and more, although never entirely, into the hands of foreigners, until, in the course of the last three or four centuries, and especially after the flou-

rishing period enjoyed by these branches of trade in the second half of the 18th century, Norway once more regained an independent economic existence.

The aggregate *foreign commerce* of Norway is estimated at kr. 439,000,000 for the year 1898, the value of the imported goods having been kr. 280,000,000 and of those exported, kr. 159,000,000, of which amount kr. 151,000,000 are represented by Norwegian products and kr. 8,000,000 by foreign products re-exported. In the year 1897, the aggregate value of the foreign commerce amounted to kr. 431,000,000, and in 1896 to kr. 388,000,000. Compared with the population of the country, this is rather considerable, being (in 1897) kr. 205 per inhabitant. The foreign commerce of France in the same year amounted to kr. 187 per inhabitant, that of Sweden to kr. 154 and that of Germany to kr. 149 per inhabitant. Denmark, on the other hand, has a considerably larger commerce per inhabitant, namely, kr. 324, and Great Britain and Ireland, kr. 341. Still larger is the commerce per inhabitant in Switzerland, Belgium and especially Holland. For Europe as a whole, the ratio per inhabitant is kr. 138 (without Russia kr. 182).

While our foreign commerce, relatively speaking, is about the same as the average of the Western European countries, the Norwegian *mercantile marine* occupies a peculiar position, inasmuch as there are only three countries in the world which, taken absolutely, have a greater tonnage than Norway, namely Great Britain and Ireland, Germany, and the United States of America. Relatively to the population of the country, the Norwegian mercantile marine unquestionably holds the first place. At the beginning of 1899, Norway had 1,068 steamships with a total net tonnage of 437,570 register tons, and 5,981 sailing-vessels, with a total tonnage of 1,120,808 register tons. The total estimated carrying power was 2,696,000 tons, each steamship ton being estimated the equivalent of 3.6 tons of a sailing-vessel. For the sake of comparison with some of the most important of other countries, we here subjoin the following table of the tonnage of steamships and sailing-vessels of more than 50 tons burden, on Jan. 1st, 1898 (river and lake vessels not included):

Countries	Steamships	Sailing-vessels	Total estimated carrying power	Estimated carrying power per 1,000 inhabitants
	Reg. tons	Reg. tons	Reg. tons	Reg. tons
1. Great Britain & Ireland	6,312,000	2,408,000	25,131,000	634
2. Germany	969,000	549,000	4,037,000	76
3. U. S. America	751,000	1,301,000	4,005,000	53
4. Norway	377,000	1,095,000	2,452,000	1,162
5. France	565,000	302,000	2,336,000	61
6. Italy	258,000	446,000	1,375,000	44
7. Spain	285,000	101,000	1,127,000	63
8. Japan	265,000	79,000	1,033,000	23
9. Sweden	188,000	258,000	935,000	186
10. British Australia	211,000	160,000	920,000	180
11. British America	85,000	532,000	838,000	115
12. Netherlands	191,000	95,000	783,000	159
13. Denmark	178,000	429,000	770,000	335

II. THE DEVELOPMENT OF NORWEGIAN COMMERCE AND SHIPPING UP TO 1850.

Even in the earliest times of the known history of our people, commerce and shipping were considered as fit means of livelihood even for the most distinguished men; and they were largely pursued also by such people. King BJORN, for instance, who ruled as a petty king under his father, HARALD HAARFAGRE, had, at the beginning of the tenth century, merchant-vessels sailing to other countries, whence he procured many costly goods. The town at which he resided, Tonsberg, was visited by many merchant-vessels from the northern part of Norway, as well as from Denmark and Germany. Even the viking expeditions, which were chiefly carried on during the 9th and 10th centuries, were often combined with a good deal of peaceful trading and shipping.

With the introduction of Christianity into Norway in the 11th century, most of the viking expeditions ceased, and life gradually assumed a more civilised form. During this time the organisation of our earliest towns, and their first rise to prosperity

took place. An important trade, domestic as well as foreign, soon developed, being carried on partly by spiritual and temporal magnates, partly also, as it must be assumed, especially from the 13th century, by a real commercial class.

Our commercial legislation during the 13th century could compare with that of the North-German and Italian commercial towns. Norway also had a considerable number of merchant-vessels besides a strong military marine. Our most important articles of export were fish, furs and skins, butter, timber, etc.; while the chief articles of import were grain, dress goods, liquors, honey, etc. Those countries with which we did most of our trading during the middle ages, were especially England, Germany, Denmark, Sweden (at any rate the now Swedish island of Gotland), Flanders and to some extent France, as well as those countries that had been colonised by the Norwegians, namely Iceland and Greenland, which came under the crown of Norway in the 13th century. The intercourse was carried on partly by Norwegian, partly by foreign vessels.

For several centuries the most important commercial town, not only in Norway, but in the whole of Scandinavia, was *Bergen*, which was established about 1070. As an instance of the importance of this town may be mentioned that the number of dock-labourers, by a decree of 1302, was fixed at 200. Among other old Norwegian commercial towns may be mentioned *Nidaros*, (about 70 years older than Bergen, now called *Trondhjem*), *Oslo* (now *Kristiania*, which was founded in 1624 near the site of the old Oslo, which had just been burnt down, and whose citizens were to move to the new town; the old Oslo now forms one of the parishes of the capital), and the above-mentioned town of *Tønsberg*, which is the oldest of our now existing towns.

In the 13th and 14th centuries, several commercial treaties were concluded between Norway and foreign powers. Thus in the year 1217, a commercial treaty is mentioned between Norway and England, which, among other things, is remarkable from the fact that it is the earliest commercial treaty extant, concluded between England and any foreign state. A commercial treaty of Nov. 10th, 1308, between Norway and Flanders exists in the archives of the town of Lille.

Our relations with the powerful Hanseatic League, which was founded in 1241, were of fateful importance for our national commerce. In early ages, the trade of foreign merchants with