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PROFESSOR ANDERS RETZIUS.
Anthropologist, Stockholm.
* 13/10 1796. † 18/4 1860.

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UNIVERSITY OF TORONTO

THE SWEDISH NATION

IN WORD AND PICTURE

TOGETHER WITH SHORT SUMMARIES OF THE
CONTRIBUTIONS MADE BY SWEDES WITHIN THE FIELDS
OF ANTHROPOLOGY, RACE-BIOLOGY,
GENETICS AND EUGENICS

A JUBILEE BOOK GIVEN OUT,
WITH THE COOPERATION OF EXPERTS COMMISSIONED BY
THE SWEDISH SOCIETY FOR
RACE-HYGIENE

BY

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PART I.

THE IMMIGRATION OF OUR FORE-FATHERS TO THE NORTH

BY

OSCAR MONTELIUS

STOCKHOLM

AMONGST OTHER PRECIOUS RELICS, WHICH HAVE BEEN preserved to the present day from the time of the sumptuous Erik XIV, is a valuable tapestry. This shows a life-size representation of the first king of Sweden, according to a Latin inscription. The name of the king is Sven, as one would expect of the progenitor of the Swedes; he was the son of Magog, whom we recognize from the First Book of Moses, as a son of Japhet, and a grandson of Noah.

The tapestry is an illustration of »The History of the Götar and the Svear», published at that time by Archbishop Johannes Magni, according to whom Magog was the first king of the Götar (Goths), and his son Sven the first king of the Svear. Ubbe, the brother of Sven, succeeded him about 246 years after the Deluge, and built the city of Upsala, according to the Archbishop's history.

The question regarding our forefathers' immigration to the North was, 400 years ago, easily responded to, and the answer was very satisfactory: »our forefathers arrived here immediately after the Deluge».

Towards the end of the 17th century, when Sweden was at the height of her political power, this date was not ancient enough for the Swedish people. Olof Rudbeck in the »Atlantica» informed his delighted contemporaries, that the Swedish peninsula was peopled *before* the Deluge, and that even then, the inhabitants of Sweden were in a high state of culture. After the Deluge, Japhet's sons Magog and Mesek came to the North. The former founded in Sweden the ancient Gothic, and the latter in Finland, the Finnish Empire. Magog's realm was divided between his sons Sven and Getar, who founded the Svea and Gothic Empires.

We must not forget that this belief was advanced quite seriously, and proof thereof was developed with all the wisdom, invention, and ingenuity, which distinguished Olof Rudbeck, one of the mightiest and most esteemed figures we meet with in the history of Swedish science. The doctrines of the »Atlantica» delighted both king and people. To deny their truth, was looked upon as a crime against our native country, and the few doubters were compelled to silence by the fear of Charles XI, and Magnus de la Gardie.

The foregoing remarks formed the introduction to an article I published in the first number of the »Nordisk Tidskrift» for 1884, in which I attempted, as well as I could at that time, to solve the problem: »Of the immigration of our forefathers to the North».

I showed that our Germanic forefathers lived in Scandinavia as far back as the later Stone-Age, thus about 5,000 years ago. The grounds for this statement were principally two. One was, that after the end of the Stone-Age there are

no traces of any great change of the people inhabiting Sweden. The other was, that most of the skulls found in graves of the later Stone-Age, are of the characteristic Teutonic type.

This opinion is now generally considered to be correct. An important question arose however: Were our forefathers the first inhabitants of the country, or was it peopled previously?

In 1884, through the then accessible though insufficient material, I found it probable that a people of another race lived here before our forefathers. On the other hand, from the knowledge at our disposal in this moment, I gather that our forefathers were the *first*, who, after the end of the Glacial Period, occupied Sweden.

* * *

During the last forty years, indefatigable investigations have brought to light many important circumstances which tend to ultimately solve this problem.

We can all quite understand that the solution of it is enticing, inasmuch as we, like other people, naturally wish to know our origin, and when our forefathers immigrated here.

The whole of the Scandinavian peninsula was, as is generally known, for many thousand years, the last Glacial Period, covered by a tremendous mass of ice and snow.

When the climate became warmer, and the ice-boundary retreated towards the North from the South coast of Scania, it was not long before plants and animals from Central Europe spread over the parts of our country which had been delivered from ice, and soon man followed.

Who were the primitive inhabitants* of our country? Where did they come from?

It is apparent that they, as well as vegetation and animals, must have come from Central Europe, over North Germany and Denmark.

It is also apparent that this people belonged to the race, which then lived in Central Europe.

Do we know anything of the inhabitants of Central Europe at that time? Yes, we know that a long-headed (dolichocephalic) race then inhabited Central Europe, and, what is very important, that in the whole of Central Europe no remains have been found of any short-headed (brachycephalic) race who could have lived immediately after the end of the last Glacial Period. The first rests of such a brachycephalic race have been met with *many* thousand years afterwards.

The long-headed race, who, at the end of the Glacial Period, lived in Central Europe, is known as the »Cro-Magnon»-race, so called after a place in France where remains of the same were found, or the »Aurignacian»-race, because the same has been identified in remains from the »Aurignacian» Period, which immediately followed the Glacial Age.**

It was a superior, rather cultivated, race.

* That is to say, naturally, the first inhabitants of Sweden after the *last* Glacial Period. It is another question, whether the North was peopled during the Inter-Glacial Period, between the penultimate and the ultimate Glacial Age. In the southern parts of the Scandinavian countries, traces of an Inter-Glacial people probably have been met with, which would not be surprising, as Central Europe was inhabited during the whole of the same Inter-Glacial Period, and even previous to this.

** It is not necessary to discuss here the relations between the Cro-Magnon and other similar types. Here, this name is used as a common designation of the long-headed peoples who lived in Central Europe during the time in question.

PROFESSOR OSCAR MONTELIUS.
Archæologist, Stockholm.
* 9/9 1843.

Accordingly, it is clear that the people who, after the end of the last Glacial Period, immigrated to Sweden, and became the first inhabitants of our country, must have belonged to the Cro-Magnon-race.

This is confirmed in a very distinct manner by the many discoveries made in our country, which prove that a long-headed race, with skulls similar to those of the Cro-Magnon-race, lived in Sweden more than 2,000 years before the commencement of the Christian Era. This is further confirmed by the fact that such skulls are, even at the present time, very common here.

As the fragile skulls can be preserved for thousands of years only under very favourable conditions, it is not surprising that no Swedish skulls are met with from an earlier period than the later Stone Age. Already long before this, the short-headed race, of which we have just spoken, had arrived to Europe.

Although this race had not replaced the original inhabitants in the North, the latter had, as is usual in such cases, more or less been blended with the new-comers. As even these, as well as the former immigrants, came to Scandinavia from Central Europe, it would be a natural consequence that the short-headed race was comparatively more spread in Southern Scandinavia, than further North. This has just been the case.

Gustaf Retzius and Carl Fürst have described a large number of Swedish skulls from the 3rd millennium B. C., and Fürst has proved, that in Scania, as in Denmark, the percentage of short-heads during that time was greater than in Central Sweden. This is just what ought to be the consequence of my theory about the primitive inhabitants of our country.

We obtain further important confirmation of this theory from another source.

If they who immigrated here after the end of the Glacial Period were our forefathers, the names of the lakes in our country would be of Swedish origin.

Several years before I arrived at my present opinion regarding the primitive inhabitants of Sweden, Professor Hellquist of Lund had examined the names of the Swedish lakes, and found that all of them, — with the exception of the Lappländish and Finnish lakes in the most Northern parts of the country — are of Swedish origin.*

* * *

Do we know anything about the *time* when the first immigrants arrived in Sweden? Or in other words, do we know, when the last Glacial Period ended here?

The Swedish geologist Baron Gerard de Geer has, by most ingenious investigations of the strata which were formed when the ice-masses retreated north from Scania, found that about 15,000 years have elapsed since the ice-boundary began to retreat north from the most southerly shore of Scania. As we have already stated, people probably came shortly after the disappearance of the ice, when the country was made habitable for human beings, and we can therefore say: It is **about 15,000 years since our forefathers began to occupy Sweden.**

Another question may be asked: Have any relics from this period been found

* Elof Hellquist, »Studier öfver de svenska sjönamnen, deras härledning och historia», in the »Bidrag till kännedom om de Svenska landsmålen och Svenskt folkliv» (Stockholm 1903—1906).

which would thus be nearly 15,000 years old? Fortunately we can reply in the affirmative.

The »almond-formed» flint implements which have been found in those parts of our country, where people first could settle, are of exactly the same type as the flint implements from the Solutré-Period in France, which is coincident to the period when the ice first disappeared in South Sweden.

* * *

The people who immigrated to the north, after the end of the Glacial Period, cannot be called Teutons, but they were the forefathers of the Teutonic (Nordic) race. At this remote age, when our forefathers first began to settle in Sweden, probably there was not much dissimilarity between the tribes, who wandered about in different parts of Central and Southern Europe.

During the many thousand years, which have elapsed since our forefathers came here and lived separated from the other inhabitants of our part of the world, they by degrees, through a natural differentiation, became Teutons, in the same way as the inhabitants of Western Europe became Celts, and those who lived in Eastern Europe became Slavs.

About 2,000 years B. C., the home of the Teutons was only Sweden, Norway, Denmark, and the most Northerly part of Germany, between the Oder and the Rhine, as is shown in the map Fig. 1. This is apparent from the fact, that within that region the well-executed and tasteful stone implements, which are characteristic of the Teutons are common; in other parts of Europe, those types are very rare, or entirely absent. Afterwards, the Teutons spread more and more on the continent, so that the whole of the present Northern Germany became Teutonic, but the Southern part was Gallic. The countries south of the Main, as well as France, were in possession of the Gauls, who belonged to the great Celtic race.

It is generally known that the conditions in Germany and France became considerably changed by the great migrations, which caused the fall of the Roman Empire.

The short-headed people who, seven- or eight thousand years before our time, appeared in Europe, penetrated to the North Sea and the Atlantic Ocean, so that the long-headed race remained comparatively unblended only in two districts very far apart: one of these districts was south-western France, and the other the Scandinavian countries.

Right up to the present time the dolichocephalic race on the Scandinavian peninsula remained almost pure.

The dolichocephalic people who remained in South-western France, after the penetration of the brachycephalic race into Europe, has been blended with these long time ago, and therefore the Scandinavian peoples are the purest of the now living descendants of the Cro-Magnon race, who inhabited Central Europe at the end of the last Glacial Period.

* * *

The above investigations entitle us to say: Our forefathers lived in Sweden since the end of the last Glacial Period, and consequently when they arrived here,

the country wich is now called Sweden was not at all inhabited. We Swedes possess a country which neither we, nor our forefathers, have taken from any other race. We Swedes have ourselves »made» our country, have cultivated the land and made the roads. We have thus an unusually good »title» af our land.

* * *

Celts, Germans, and Slavs, with many other peoples in Europe speak, as do Persians and Hindoos, languages which are related, and which form the great Indo-European, or — as it is also called, though not so correctly, — the Indo-Germanic family of languages. All these peoples are supposed not only to speak languages which have their origin in the same root, but also to have themselves a common origin.

Fig. 1. The country of the Teutons 2,000 years B. C., (shown by the dotted portions). The districts (Finland, the Baltic provinces belonging to Russia, and the country round the Vistula, etc.), to which the Teutons had already migrated during the stone age, are not given on the map.

Some scholars have supposed that the home of the Indo-Europeans was to be found in the countries round the Southern Baltic.

My opinion is however, that this supposition can not be correct.

Here in the Scandinavian North, we have the home of the Teutonic race, but not that of the Indo-Europeans. All that I know of the remote ages, when the Indo-Europeans left their native land to spread over the earth, has convinced me that we cannot take upon ourselves the honour of our country being the cradle of the Indo-European race.

It is honour enough that the Teutons became Teutons in our country: a race who has inscribed its name on many pages of the history of civilisation, and who — I hope — will, even in the future, have a great mission in the mutual work of furthering the wellfare of Mankind.

EMIGRATION FROM SWEDEN IN ANCIENT TIMES

BY

OTTO v. FRIESEN

UPPSALA

THE GOTHIC HISTORIAN JORDANES IN A FREQUENTLY QUOTed passage in his Getica (Gothic history) calls Scandia, i. e. the Scandinavian peninsula, a »workshop where tribes are forged» and a »womb of the peoples». JORDANES wrote in 551 A. D. in Italy. He himself was of Gothic birth and can thus be supposed to be quite familiar with the legends and songs of their past fortunes that the Goths, like other Germanic tribes of the period of migrations, preserved with extraordinary fidelity from generation to generation.

His above-quoted statement starts out from the assumption that the great region in the northern sea that was taken to be an island called *Scadinavia* or *Scandia* by the geographers and historians of antiquity was the primeval home of a number of the Germanic tribes that appeared in Middle and South Europe during the period of migrations and whose onset at length overthrew the Roman Empire, the great civilization of antiquity. He relates himself that his own people, the Goths, under the leadership of King Berig once left this island and crossed the sea in three ships. The first time they are mentioned in classical literature they are settled on the south coast of the Baltic in the neighbourhood of the estuary of the Vistula. Another of the leading Germanic tribes on the Continent, the *Gepids*, has also, according to JORDANES, come over the sea from Scandia to the islands in the delta of the Vistula, which were called *Gepidoios* after them — the Gepidislands. Jordanes' general view of Scandia as the original home of a number of tribes of that time also agrees with the traditions quoted by other writers of the period of migrations.

PAULUS DIACONUS, who during the time of Charles the great wrote the history of the *Langobards*, tells us that this people came from the island of Scadinavia, which they left because the country was unable to maintain the whole of their populous tribe. The same legend is quoted a couple of centuries earlier in the introduction to the statute-book of King Rothar, the Langobardian king, and is thus obviously based on an ancient tradition in the tribe.

According to the tribal legend the *Heruli* too are one of the peoples who emigrated from Scandinavia. Jordanes relates that they were expelled from their native land by the *Dani*, who had issued from the tribe of the *Svear*. As early as the 3rd century they appear by the side of the Goths in the south-east of Europe, where they ravage the coasts of the Black sea and the Archipelago. But on the other hand they also appear in the Viking expeditions along the shores of Western Europe in France and Spain. The appearance of the tribe in these widely separated regions along the two main commercial routes to the north from

the Roman empire, the route along the line of the Vistula and Dnieper to the south-east and to the estuaries of the Rhine to the south-west, indicates that, in accordance with JORDANES' statements, their original home is just Scandinavia.

Finally in this connection we may recall the above-mentioned Dani, who are identical with the modern Danes. It is true that this people is not one of those who left the Scandinavian region, but the information JORDANES has given about them indicates, however, that they represent a similar tribal displacement from north to south within Scandinavia itself. According to the interpretation of JORDANES' words in the place referred to it is most probable on both internal and external grounds, that they have proceeded from the tribe of the *Svear* and displaced the Heruli from what is now Scania. As, according to older and mediæval linguistic usage, the name Svear refers to a tribe dwelling on the north side of Lake Mälar, it is there we must look for the point of departure of the undertaking that led to the conquest of the Heruli and caused their appearance in the continent of Europe.

Not only ancient tradition but modern scholarship as well bears witness to Scandinavia as a »vagina gentium», a »womb of the peoples». I shall here only mention in passing that contemporary philologists, archæologists, and anthropologists have gradually agreed that the original home of the Teutonic peoples was in the region round the western Baltic and the south-east of the North sea, which would thus comprise the southern parts of the Scandinavian peninsula, the Danish islands, Jutland, and North Germany between the Ems and the lower Oder. Observations that archæological investigators consider they have made and that I shall touch on briefly here, have a more direct connection with the subject under discussion.

The Finnish archæologist A. M. TALLGREN has observed that at the beginning of the late bronze age about 1000 B. C. there was in east Russia at the big bend of the Volga a type of axe that has been found at Lake Mälar and occurs there and in the west of Finland. The middle Swedish axe has given rise to new local forms in Russia. According to TALLGREN's view the extension of this axe to the region of the Russian bronze age cannot be due merely to commercial connections but to a Swedish colonization of East Russia.

The German archæologist GUSTAF KOSSINNA* asserts that a special culture that distinguishes the region between the lower Vistula and the lower Oder during the oldest iron age (750—150 B. C.) is maintained by Germanic tribes who had crossed the Baltic from the islands and mainland of Scandinavia. His view seems to be accepted by a number of authorities. According to KOSSINNA these tribes are identical with the later *Vandals* mentioned by the classical writers and known from the history of the period of migrations. A part of these Vandals was the tribe of the *Silingi*, whose name is seen in the name of *Silesia*. The name Silingi has been connected with *Selund*, the oldest form of the name Sjælland.

During the two centuries immediately before the beginning of our epoch there appear, according to Kossinna, two new Scandinavian tribes in the north-east of Germany. These tribes are the *Rugii* and the *Burgundians*. The name of the former is seen in the old Norwegian county *Rogaland* and the mod.

* See the bibliography in J. KOSTRZEWSKI, Die ostgermanische Kultur der Spätlatènezeit I, p. 4 (Mannus-Bibliothek 18).

Norwegian *Ryfylke* (= the present county of Stavanger, the south-western corner of Norway). Their name perhaps survives in North Germany in the name of the island of *Rügen*. The *Burgund(ian)s* emigrated from Bornholm, in ancient times *Borgund*, later *Borgundarholm*. Because the ancient necropolis at Bornholm ceased suddenly to be used at the end of the third century A. D. KNUT STJERNA considered that he could draw the conclusion that a new great emigration then took place from the island, where the dwellings that had to a great extent become empty were gradually occupied by immigrants from the region round the Kalmar sound.

About the middle of the first century B. C. the *Goths* arrive at the delta of the Vistula, according to archæological evidence. Antiquarians were formerly of the opinion that they came there from Gotland, whose inhabitants, the *Gutar*, have a name that philology has shown to be identical with that of the Goths. Now, however, there is a greater tendency to assign their original home to the east coast of Sweden in the county of Kalmar or Östergötland.

Not only archæologists but also the modern historians favour the opinion that many of the tribes of the period of migrations emigrated from Scandinavia, especially the Baltic region. LUDWIG SCHMIDT, the German, who is probably the modern historian who has studied the period of the migrations most extensively, is of the opinion that the Vandals, Rugi, Burgunds, Goths, Gepids, Heruli, and on the whole all the Germanic tribes on the Continent who at the beginning of our epoch were settled in the present Germany, east of the Oder, in Poland and west Russia, have immigrated to these regions from Scandinavia. These tribes are generally grouped under the heading East Germanic, and philologists are unanimously of the opinion that the languages or perhaps more correctly the dialects they spoke are much more closely related to the Scandinavian languages than to the old West Germanic languages, those from which have sprung modern high and low German, Dutch and English. But according to LUDWIG SCHMIDT not only the real East Teutons, i. e. the tribes east of the Oder, but the Langobards as well, whom we first find on the continent by the Elbe near Hamburg, are originally Scandinavians.

No Germanic tribes played so great a part in European politics during the last stage of ancient times and the beginning of mediæval times as the East Teutons. It was through their intervention that the Roman Empire, the greatest and mightiest power that the West had so far seen, was completely shattered. And we get an idea of their positive significance for Europe if we remember that at the beginning of the 6th century the East Goths ruled over Austria south and west of the Danube, the whole of Italy, and south-east France, the West Goths possessed Spain and a part of southern France, and the Vandals North Africa, the Balearic Islands, Corsica and Sardinia. And round the northern frontier of the Ostrogothic dominion the kingdoms of the Burgunds, Langobards and Gepids formed a broad belt in Central Europe. In other words, the greatest part of the most fertile and cultivated countries of the old world were in the possession of the East Teutons.

With regard to the origin of the East Teutons a glance at the geographical situations affords us some guidance. The oldest dwelling-places of the East Teutons is the coast region between the mouths of the Oder and the Memel. This

region is situated opposite the Baltic coast of Götaland and has from the very earliest times been connected with it along one of the main routes from south and central Europe to the north, the route along the Vistula. It is therefore quite natural that a horde emigrating from the Swedish Baltic coast should, in choosing the direction of their journey, often decide on the Prussian region, which was fertile and inhabited by a not very warlike people.

What were the causes of this Scandinavian emigration, which was to have so radical a significance for the fate of Europe and the world?

Before proceeding to answer this question I shall try to explain some ideas and terms that are often used in an indistinct and misleading fashion. By a tribal emigration I mean here a removal of a people in which the male population — or part of this — from a whole district or country leave their native place in a collected troop together with their wives, children and property in order to try to maintain themselves in a foreign land. The Viking bands are only tribal emigration to a slight extent. In most cases the Vikings were a larger or smaller band of warriors who wen toff on trading and plundering expeditions in the spring, returning home towards the autumn with their earnings and the booty. Sometimes the Viking adventures might extend to real campaigns lasting several years; many thousands of men took part in these and their purpose was to capture spoils, levy forced contributions, or to suppress the countries they attacked. This was the character of the Danish invasions of France in the middle and second half of the 9th century. In these cases it was exclusively or essentially warriors who took part in the journeys. It may happen of course that individuals or larger bands settle down in the lands they visit, take wives in the foreign country, and arrange for a long, perhaps a permanent, stay. But this is not yet tribal migration in the real sense of the term. The first real instance of this is when the Vikings settle down in the conquered country with their families, as for instance the Danes did in the east and north of England in the second half of the 9th century or the Norwegians did at the same time in the Hebrides, Orkneys and in Ireland.

It was principally only hordes of warlike young men who took part in the Viking campaigns. The chief purpose of these enterprises was war and, if I may put it so, private finance. And after a successful conclusion the participants returned to their homes. As the causes of the Viking expeditions modern historians give chiefly the over-population of the North and the desire for spoils and adventure in the male population. This view also agrees with the accounts given by contemporary western writers. Only in exceptional cases were the Viking expeditions real emigrations, carried out for this purpose.

The term over-population also needs a few words of explanation. A country may become over-populated in different ways. One way is when the number of people reach or exceed the normal limit of the country's power to give its inhabitants a bare subsistence at a certain stage of culture. One might call this type of over-population chronic. Another type is temporary. It arises when a country's production of the necessities of life is suddenly lowered by unfavourable climatic or other conditions to such an extent that the people are affected by a scarcity of what is necessary to maintain life. According to the now prevalent opinion chronic over-population was the main cause of the Viking expeditions.

Temporary over-population is considered to have played a very minor part. I shall not examine the causes of the Viking expeditions here, but only mention that the idea that before the beginning of the Viking period Scandinavia had a very large population, even so large that the country was no longer able to maintain it under normal conditions, is based on rather weak evidence. The reasons for this specially adduced are the high figures given by the terrified western Europeans in their accounts of the Viking ships and warriors. Thus in 885 Paris is said to have been besieged by 40,000 men and in 845,600 ships are supposed to have sailed up the Elbe against the Emperor Ludwig. This implies, says the Danish historian JOHANNES STEENSTRUP,* that the population that sent forth these hordes was exceedingly numerous. And he is of the opinion that it has reached the limit that the country could support with the means of subsistence at that time. We know, however, that during the Viking period enormous stretches of cultivable land were untouched and it is impossible to say, as other historians have done, that the agricultural implements and methods were so primitive that this land could not be used. With the immense forests that were then in existence they had an ample opportunity to use the primitive method of burn-beating, which needed no animal manure — they simply burned the forest, sowed in the ashes, and were then able to reap not one but several harvests, getting good pasture into the bargain. When the open ground was no longer sufficient or was exhausted they could thus get corn for the people and food for the cattle from the woods.

At this stage of civilization disease and a high mortality strongly counteracted the probably great prolificity. And these factors operated with increased force in times of scarcity and want, when peoples' power of resistance was successively decreased by privations. There was in addition a method of regulating a too great increase in the population, that later times would not employ, the exposure of children. It was Christianity that put an end to this barbarous custom. But even in the year 1000, when Christianity became the legal religion in Iceland, they insisted, among other things, on the retention of this right.

It is thus at present rather doubtful whether a chronic over-population really was the main reason for the Viking expeditions.

* * *

It has already been pointed out that the tribal migrations were at bottom quite a different phenomenon from the usual Viking expeditions. The migrations of the peoples were real emigrations, when the emigrants left their native country in great bands with their wives and children and goods. If the desire for adventure and thirst for spoil drove the young warriors of the Viking expeditions from their homes, we may be certain that, however highly we may estimate the martial spirit of enterprise in the old Scandinavians, it was not so great, nor was their solicitude for their closest relatives, whose needs and future they had to provide for, so small, that they would risk *their* life and prosperity in the uncertain hope of victory and spoil. We must assume that only one thing could

* Normannerne I, p. 209.

drive these emigrants with their wives and children from their native soil, and this mighty force was dire need.

We have direct testimonies from ancient times to the effect that such need compelled the old Scandinavians to emigration en masse. During some centuries before the beginning of our epoch the Cimbri were a tribe dwelling at Limfjorden in Jutland, in the district now called Himmerland with Aalborg as its capital. Enormous floods from the encroaching sea had covered great stretches of cultivated land and pasture and deprived many of the surviving peasants of any possibility of maintaining themselves. This occurred about 120 B. C. Together with parts of other tribes living by the sea who had been overtaken by the same misfortune at the same time the necessitous Cimbri marched through Germania down to the Danube, penetrated into the rich Roman province of Gallia after having repeatedly asked the Romans in vain to assign them land and seed for cultivation, conquered the Roman armies sent against them, extended their invasions and plundering expeditions to Spain, and at length invaded Italy itself. It was only then that Marius, the great Roman statesman and soldier, succeeding in checking their advance, definitely annihilated them in a great battle in 101.

Thanks to classical writers, we probably possess with regard to the Cimbri the most detailed and reliable information we have of any migrating tribe from the time they left their native country until the tribe perished. This information clearly shows us that the Cimbri left their home and their kinsmen in the North because of what I have called temporary over-population, caused by floods.

For the same reasons it is considered that the Langobards who migrated from Scandinavia to the valley of the Elbe, the present Bardengau, partly abandoned their native homes about 300 A. D.*

The Celtic tribes at the mouth of the Rhine are also described by classical writers as having emigrated because of floods.

In the Scandinavian peninsula floods that are sufficiently serious to affect the sustenance of the people are, on account of the nature of the country, very rare. But we have here instead to contend with a natural catastrophe of the greatest importance from this point of view, namely failure of the crops. This catastrophe affects human life in these regions all the more, because in its severe forms it recurs or rather in earlier stages recurred frequently during each century, often several years in succession.

Even the legends from pre-historic time tell us of serious failures of the crops, and the more light is thrown on the past vicissitudes of our people, the more distinctly we see the scope and effects of this terrible scourge. From the last centuries of the middle ages we have a series of accounts of years of drought or rains which caused famine and its concomitant diseases among human beings and cattle. During the 16th, 17th, and 18th centuries these periods of distress occurred almost regularly in every generation, and during the most severe ones, which might last for a series of three, five, sometimes even as many as eight years, hundreds and thousands of human beings perished from hunger and privations.

The more rational agricultural methods of later times are able to an extent undreamt of before to counteract or nullify the reverses of nature, and the disas-

* See L. Schmidt, Allgem. Gesch. d. germ. Völker, p. 79.

trous effects of the bad harvests during the last centuries have been powerfully and effectively counteracted by precautious and good management. But even during the recent years of war, on account of a stoppage in the supplies from abroad, we have had at least in the towns, a rather vivid experience of what it means to have only a supply of bread that is inferior in quality and decreased in quantity and, in addition, to have a deficiency in the necessary fat — butter and pork.

May we assume that failures of the harvest occurred about as often in prehistoric as in historic times and had as disastrous consequences for the sustenance of the people then as later? In order to answer this double question two other questions must first be examined. How was the climate in our regions in prehistoric times compared with the present? And were agriculture and cattle-breeding as important then for the sustenance of the people as they are now?

With regard to the climate botanical geographers have proved, by means of plant remains in our peat-mosses, that during the later stages of the stone age and during the bronze age there was a warmer and drier climate than now. The summer had an average temperature now characteristic for north and central France. At the end of the bronze age a deterioration took place. The climate became colder and damper to an extent that had a strong effect on vegetation. The noble foliferous trees and the southern plants disappeared from the north. Towards later times a slow improvement in the climate is supposed to have taken place, but on the whole we have had about the same climatic conditions from about 500 B. C. to the present day.

There are two factors in the climate of historic times that are of special importance for vegetation: the distribution of the rainfall within the period of growth — spring, summer, and autumn — and night frosts.

»Rainfall during spring and midsummer», says H. Juhlin-Dannfelt, one of our foremost experts on Swedish agriculture,* — »when the grain takes the greater part of its nutrition, is decisive for the size of the crop, and on the whole damp weather is most beneficial during this time, while, on the other hand, drought during late summer and autumn is favourable to harvesting. The value of the crop and the burden of the work connected with it depends to a great extent on the favourable course of these climatic conditions. Unfortunately the climate of Sweden is the opposite of favourable from the point of view of agriculture. The months of May and June are generally distinguished by persistent drought, making it difficult for the grain to grow and checking its development, while the amount of rain in July and especially in August is generally great, and rain often delays the harvest very greatly, increases the amount of work attached to it, and injures both fodder and corn. — The distribution of the rainfall differs, however, in different parts of the country. The higher parts of south and middle Sweden have on the whole and even during spring the most abundant rainfall. Then comes the west coast. The east coast, on the other hand, and the districts round the great lakes have less rain especially during early summer, the period so important for the development of vegetation.»

With regard to night frosts, southern and middle Sweden is rather frequently exposed to these during early summer, when the vegetation, both fodder and

* In J. Guinchard, Schweden, Sthlm 1913, p. 39 ff.

grain, is specially sensitive, and disastrous night frosts occur not infrequently even during late summer, as early even as July.

As causes of failure of the crops in earlier times the sources indicate sometimes hard drought during early summer, sometimes incessant rain during harvest-time, sometimes, finally, severe night frosts. When the misfortune came, some or all of these factors might cooperate.

Were the Scandinavians of prehistoric times dependant to as great an extent as during the historical period on the products of agriculture and cattle-rearing for their sustenance?

Only a generation ago it was still considered that our ancestors lived mainly by hunting and fishing and moved from one place to another to seek their prey. And this idea seems even now to be rather common. The investigations of the last decades have shown, however, that at least from the beginning of the later stone age the people of Scandinavia were settled and that their domestic economy was based chiefly on agriculture, which gave them the vegetable nutrition, and cattle-rearing, which gave them the fat necessary — butter, tallow, and pork.

The species of grain cultivated in the North during the later stone age was especially *barley*, but also *wheat*. In addition there was *millet*. During the bronze age *oats* become known, at least in Denmark. During the period of migrations we get *rye*.* During the early middle ages, according to statements in the laws of the counties, the cultivation of rye was of great importance in our country. But barley was probably still the chief cereal. This was at any rate the case at the beginning of the modern period, according to Hans Forssell.** In 1571 in the Sweden of that time barley formed 65 % of the harvest, rye 33 %, oats and wheat the rest, i. e. 2 % together. At the beginning of the 19th century the figures are: barley 25 %, rye 29 %, oats 27 %, and wheat 3 %. Thus even more than a century ago barley was no longer the most important species of grain. It had been surpassed by both rye and oats, an alteration of the conditions to the prejudice of barley which has continued in the same direction during the latest generations, so that in 1880 barley formed only 13 % of the whole harvest.

The most important cereal during the prehistoric times was thus probably barley. But this fact exposed the harvest even more than now to the unfavourable effects of our climate. Corn sown in spring is naturally even more exposed to the ravages of the spring drought than winter corn, and also to the night frosts of early summer. For this reason the risk of a bad harvest was greater when barley, sown in spring, formed a very much greater part of the grain than it did later on. In addition the soil was worked and manured much worse in earlier than in later times. Lack of draining made it impossible to use a large part of the land that now gives the best and most certain crops, and the art of ditching ground attacked by frost, which spread destruction to the adjacent fields, was unknown.

All these circumstances together and others in addition justify us in assuming that bad years and complete failure of the crops of grain and fodder were both more common and more serious in earlier times than during the last couple of centuries.

* See Hoops, Reallex. I, p. 30 f.

** Art. on Swedish agriculture (Proceeding of the Academy of Letters, 29), p. 17 ff.

How are we to imagine that our ancessors met these periods of failure of the crops, which certainly occurred almost every generation? They could endure a single bad year by tightening the belt and mixing bark in the bread baked from the previous year's savings. In case of need they could of course also kill some of their cattle. But if two or more bad years came in succession it was worse. The cattlestock, which was underfed during the winter with heather and spruce brush, found no pasture on the ground during the dry early summer. It dried up, grew still more thin, and was seized by diseases. The people, exhausted by the starvation of autumn, winter and spring, saw in front of them the certainty of a half or third-part harvest again. Something might perhaps be obtained by sea from friendly and more fortunate neighbouring tribes by offering them precious things, gold and silver, jewels and selling at a low price the skins that were generally the most important object of exchange in foreign trade. But what was the little that could be procured with the undeveloped communications of the time among so many who were starving? And in most cases the effects of the bad times extended to neighbouring tribes as well. They too were in the same trouble and misery or had at least nothing to give up. By midsummer it was evident that thousands would perish during the terrible year that was imminent, unless something was done in time. They sacrificed and prayed to wrathful gods, and magicians and witches eagerly exerted their magic arts so as to move the powers of the elements. »But god helps those who help themselves», says an old Swedish proverb. They were not to fold their arms and trust blindly to the grace of gods and powers, and it was no part of the Scandinavian temperament to await passively a harsh fate, however convinced they were that what the Norns had decided must be *fulfilled*. In despair voices were raised to kill the *aged* people, and even the young children.

But in a nation of born organizers wise men had even thousands of years before found a more humane and more practical expedient, which though desperate, could still be attempted wich greater equity. In order to decrease the number of those who were competing for the exceedingly small supply that existed and could be expressed from the coming harvest, lots were drawn to decide who were to set out and seek deliverance in foreign countries. From very different sources and times we have legends showing that this expedient was used. Thus Paulus Diaconus in his history of the Langobards relates that a third of the tribe living in Scandinavia, after drawing lots, set out from their national land to dwell on the south coast of the Baltic. It is true that he states that this happened because the people had so increased in number during the course of time that the country could not feed them all. But for reasons shown above this is probably incorrect. It was much more probable that a temporary over-population, caused by famine, drove them forth from hearth and home.

The Danish historian Saxo,* who lived in the later part of the 12th century, recounts an old tradition of a severe failure of the crops that visited Denmark in ancient times during the days of King Snio. At first the king prohibited all luxury, among other things the brewing of beer. But it turned out to be as impossible to enforce this total prohibition as to enforce a strict rationing in our

* See Grundtvigs translation, f. 378, cf. Steenstrup, Norm. I, p. 197.

own times. They brewed in secret. The failure of the crop continued, however, and the people saw themselves on the brink of ruin. A suggestion was made in the thing that all children, cripples and aged people should be put to death, only those capable of bearing arms and of working should be allowed to live. The commonalty and the king assented to this suggestion. But a compassionate woman pointed out to the people the inhuman crime against the natural feelings for parents and children that this decision implied, and suggested instead that lots should be cast so as to select the necessary number of people to leave the country. And this suggestion was accepted by the people. Saxo combines this account, obviously based on old Danish tradition, with the above-mentioned legend from Paulus Diaconus as to the emigration of the Langobards.

Saxo's recital appears again in the work that Olaus Magnus, the last catholic archbishop of Sweden, had printed in Rome in 1555, »On the Scandinavian peoples».*

According to Olaus Magnus** the »disting» market (annual spring market) at Uppsala got its name from Queen Disa: »This gifted and resourceful woman saw that the greater part of her people ran the risk of perishing by a terrible famine caused by the supply of corn and root-crops coming to an end owing to the extremely unfavourable climate. She succeeded in persuading the people to draw lots in order to decide which of them were to leave their native soil and find new dwelling-places on the other side of the sea.» Olaus Magnus adds a few words, probably indicating that they had previously adopted the resolution mentioned by Saxo, namely to kill those who were unfit for work.

In the Danish Ryd yearbooks, written about 1300, is mentioned an emigration of every third man among the bondsmen and poor people to the part of the south coast of the Baltic inhabited by Slavonic and Finnish tribes***. Here they remained, as they found these fertile tracts very pleasant. The fact that serfs are mentioned as an essential contingent of the emigrants implies that it was bad times that caused the emigration, for otherwise the Danes would not voluntarily have resigned so valuable a part of their property as their serfs.

Finally we may mention in this connection a remarkable account from ancient Gotland. The Gotland legend, written down about 1350, probably composed about a century earlier or somewhat more†, mentions that after Gotland became colonized the population increased so greatly in the course of time that the country could not feed the whole of the people. By drawing lots it was decided who had to leave the country so as to make room for those who stayed behind. A third of the population was selected to go into exile. Those chosen were allowed to take with them all they possessed above the ground, i. e. all movable property. They did not like to leave their native country, however, and went off to Torsborgen and settled there. But this was not in accordance with what had been decided and they were expelled from there, after which they went to Fårön, an Island at the north end of Gotland. Here, however, they were unable to maintain themselves, but crossed the Baltic to Dagö on the Esthonian coast, were they built a

* Bygdén in Samlaren, XVII, p. 48.
** Ol. Mag. lb IV, cap. 6.
*** Cf. Steenstrup, Norm. I, p. 194.
† Pipping, Guta lag och Guta saga. f. 63.

castle that was still there in the 13th century. Thence they moved farther up the river Dyna and down through Russia to the Grecian empire, where at length they obtained permanent dwelling — places from the Grecian emperor.

In this case we are probably concerned with a historic event, perhaps several, that have been preserved in the memory of the people in the form of a legend. Here too what is reasonable is that the real cause of the extraordinary measure of banishing a large portion of the people is a famine caused by failure of the crops.

We thus find that tradition both among those nations who have emigrated themselves and at home in Scandinavia can tell us of emigrations from the Scandinavian regions caused by the country being over-populated. The surplus of population here concerned was in all probability not of the sort that I called chronic above, i. e. where the population is constantly greater than can be supported by the average food production of the country.

In assuming this it has been supposed that the population consisted of hunters and fishermen or led a completely or half nomadic life. As a matter of fact it was a settled agricultural people with good possibilities of increasing their prodution to the same extent as the population increased. There was a great deal of cultivable land not yet being used; there were also implements and methods whereby they could turn this land to account. During certain periods the country so far settled may to some extent have been over-populated on account of the clan's disinclination to split up and leave their original ancestral farm and settle down far away from it to break new ground and form new farms. Thus in more recent times Gustav Vasa complains in an edict of 1555 that the peasants crowd together too much in their old farms. But these inconveniences were gradually removed without any emigrations.

It was, as we have already seen, the terrible effects of several successive failures of the crops that made the people leave. The starving people sought for food where this could be got. The population of one district certainly applied to another that was temporarily better off. Even at the beginning of historic times the Norwegian kings had to adopt energetic measures against those who — as it was said — ravaged their own country. It is a reasonable supposition that the district castles, so numerous in our country, which partly derive their origin from the period of the migrations, were to a certain extent erected to protect the supplies of grain and cattle from a desperate and starving populace in adjacent hundreds and counties.

In most cases, however, the failure of the crops extended over great regions of the country, and there was no other way out of the difficulty than to expel part of the people so that the fragments obtained from the bad crop and the reduced stock of cattle might be sufficient for those who were left to exist in a state of semi-starvation until the next harvest.

Those who were exiled had ships allotted to them in which with their families and household goods they could cross the sea to places where they knew or supposed that the harvest had been better and there was food for them. From a Swedish point of view the first districts that had more favourable agricultural conditions and more certain harvests were Scania and the countries on the south and south-eastern side of the Baltic. It was there most frequently that the course was steered.

If the newcomers did not succeed in arranging matters peacefully they had recourse to force of arms. If they were fortunate, the fugitives obtained possession of greater or smaller parts of the country and expelled its former owners. This throws light on Jordanes' statement that the Dani (Danes) were Svear who drove the Heruli forth from their homes in Scania. The name Dani seems really to means dwellers on the plain and there is reason to assume that the Danish kingdom was formed by these Scanians, who gradually subdued the Danish islands and Jutland as well.

But the main region to which the emigrants directed their course was the German coast of the Baltic past of the mouth of the Oder. Century after century fresh hordes arrived there and succeeded in gaining a foothold there. Each time it was necessity that paved the way, but when the emigrants found themselves at home in the new country and had experienced its fertility and the greater security of its sustenance, a message was sent across the seas to their relatives at home. They needed to strengthen their ranks against the former owners attempts to expel the newcomers and regain their land.

Thus one great tribe after another grew up on the fertile south coast of the Baltic and penetrated up the valleys of the Vistula and the Oder.

In language too these East Germanic tribes show a closer affinity to the Scandinavians than the Germans, Dutch, Frisians or English.

Finally from the beginning of our epoch the East Teutons moved farther to the south-east, south and south-west down towards the frontiers of the great Roman empire, to districts favoured by a still more fertile nature and rich with the flourishing culture of hundreds and thousands of years. But then they had left their maternal hearth, the meagre soil and severe climate where in their struggle for a human existence amid troubles and hardships at the limits of the cultivable world they had grown strong in body and will. Amidst the abundance of Central Europe and the Mediterranean there was a gradual transformation of the qualities that had given them their character, their physical and spiritual elevation. After five hundred years all the political edifices they had erected had collapsed. A few centuries later their language and their national qualities had in most cases disappeared. And now only anthropology can trace them with difficulty in some Italian, Spanish, and African settlements, where blue eyes, light hair and beards, and unusual height bear witness to an ancient Northern weft in the inhabitants.

THE MORE IMPORTANT RACIAL ELEMENTS THAT FORM A PART OF THE PRESENT SWEDISH NATION

AN ORIENTATING SYNOPSIS

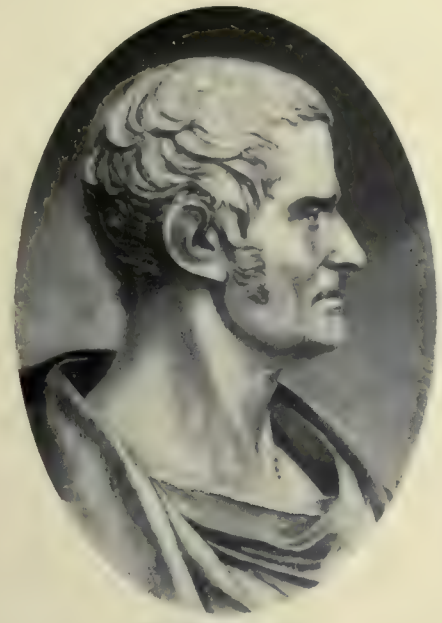
BY

H. LUNDBORG

IT IS VERY USUAL TO FIND THAT IN THE COMMON CONCEPtion, no clear distinction is made between a race, in the antropological sense and a nation. The two ideas are used alternately and in many cases they are regarded as equivalent. This is however wrong. It must be borne in mind that here one has to do with dissimilar terms. By a *race* is understood a more or less numerous group of human beings all possessing many similar bodily (and mental) qualities, which display a pronounced hereditary tendency. Thus one speaks of certain distinctive racial features, a certain racial characteristic, etc. It includes all the qualities that continue to exist through all the ages, as long as the race in question keeps itself pure and unmixed. By a *nation* again one means a larger group of human beings who constitute a unit for themselves, distinguished by a similar culture. The latter is determined in its turn by the traditions of its environment and the circumstances of the community, i. e. a common language, the same religion, common laws, etc. The characteristics of a nation therefore are not the same thing as the characteristics of a race. The former is gradually changed, the change depending on the one side on the different racial elements of which a nation is composed — they might alter considerably by reason of immigration and emigration, a different birth-rate and death-rate, etc. — on the other side by the varying influences of culture on the mass of the people at different times.

Persons belonging to the same race have many similar hereditary features. The sum of these gives the characteristics of the race in question. If the race remains pure they appear again and again, generation after generation during hundreds of years and even longer. New hereditary combinations arise through the crossing of different races.

Science has with great zeal endeavoured to investigate all possible kinds of organisms, but strange as it may sound humanity itself has been treated in rather a grudging fashion. There are to be found animals and plants, of which from a biological point of view, we have far greater knowledge than we have about ourselves. It ought to be obvious to everyone that such a condition of things cannot be right. Mankind of all living things ought to occupy the first place as an object of research. We want to know what mankind is like, as a race and as a nation — what qualities are inherited and how this inheritance is brought about, in what degree it is susceptible to external influences, etc. These questions connected with the life of the family, the nation, the race, which the modern



PER HENRIK LING.
The father of Swedish gymnastics.
* 15/11 1776. † 3/5 1839.

PROFESSOR MAGNUS HUSS.
Physician, President of the Medical Board, Stockholm
* 22 10 1807. † 22 4 1890.

PROFESSOR CARL MAGNUS FÜRST.
Anatomist and Anthropologist, Lund.
* 14/12 1854.

PROFESSOR GUSTAF RETZIUS.
Anatomist and Anthropologist, Stockholm.
* 17 10 1842. † 21 7 1919.

race biologist tries to answer, are of extraordinary importance for the whole world. Meanwhile they must have access to a very comphrehensive material.

The investigations in heredity made in modern times, teaches us that the natural type (genotype), developed during the course of hundreds and thousands of years, in different peoples and races, is the essential type and that it never wholly repeats itself in different individuals except in the case of such twins who have their origin in one and the same ovum or egg. More or less diverse hereditary combinations form therefore as a rule, the groundwork of every new individual who is conceived. Within certain bounds the environment afterwards becomes a force causing still further dissimilarities, but these alterations in one or another direction (modifications) acquired during life do not change the natural disposition.

Mankind, like all the other higher organisms, can be compared to a mosaic. The many small pieces, which correspond to the different hereditary units (or factors) taken together form a whole picture. These bits can be combined in varying patterns and so give rise to different natural types, different individuals, and, in the course of time, different races and nations.

It is certain that the hereditary substance or natural type in different individuals, peoples and races may be quite different. In the common language there are many phraces which bring to light the fact that mankind half unconsciously, recognizes this, for instance, »He (or she) belongs to a good race», »That nation is a strong race», »One can tell the race», etc.

The different dispositions, the outward characteristics as well as the inner, are inherited according to a fixed law, each one for itself. It remains now to ascertain how this happens, examining characteristic after characteristic. This work is now eagerly being done in different countries. A great deal of knowledge has really been won already, but the greater part still remains to be done.

A careful study of individuals belonging to different races and nations is necessary, and the work must be done systematically and exactly.

In a free country with free institutions, a stratification among the people, layer after layer, arises of itself. One can distinguish a natural aristocracy, (the result of fortunate hereditary combinations and a favourable environment) a middle class, and a lower class, which in ancient days formed the so-called serf or thrall class. As a rule these three layers are fairly unlike each other, in some countries to such an extent, that they are formed of wholly different racial elements. Fortunately Sweden is not one of these, but one finds even here that among Swedes belonging to different classes, a not unimportant difference can be observed in the combinations of race.

A people composed of good racial elements creates for itself good conditions of society, if it is allowed to develop freely, a people of bad race is not capable of this.

There are at present (as in the past of the world) nations of wholly different quality, some are clever, enterprising and vigorous, others are weak, sluggish and lacking in vitality, in a word nations that are dying out. A whole series of different grades are to be found between these two poles.

No nation remains altogether unaltered during the course of time, it developes and becomes ennobled or it degenerates and becomes debased. History shows us many

examples of this. There are many facts which co-operate to cause such changes. One of the most important, which at the present time makes itself very apparent owing so mass-emigration, industrialism, commerce, war, etc., is the unchecked mixture of blood which takes place between nations and races. This mixture of blood has not only very apparent biological consequences, but it is also not without influence on the cultivation of a people.

* * *

We possess a relatively good knowledge of the present day Swede, owing to the great work Anthropologia Suecica Professors G. Retzius and C. M. Fürst, which was published in 1902 and which is founded on measurements taken from about 45,000 conscripts at the age of 21 years.

The average height of the Swedes in the whole of Sweden was then 170.88 cm. Excepting Lappland all the provinces of Sweden showed an average height of over 170 cm. Gothland showed the highest average or 172.74 cm. The two most northern provinces, Lappland and West Bothnia (Västerbotten), as well as the two most southern, Blekinge and Scania (Skåne), showed the lowest average which fact seems to point out that the variations in the average height in different provinces to an important extent depends upon the mixture with races of shorter stature (round skulls), in the north with Finns and Lapps and in the south with Alpines and other race elements to be found among the people. As the body has not finished growing at the age of 21 years, the average height for a full grown Swede (after correction) is somewhat higher. (= 171.88 cm.) It has further increased during the last twenty years.

In the whole of Sweden 87 per cent of the population were long skulls and 13 per cent round skulls. Within the first mentioned group 30 per cent were genuine long skulls and about 57 per cent mesocephali.* The greatest number of round skulls are found in Lappland, where they reach 23.67 per cent, in Upland with 20.98 per cent, in West Bothnia with 19.03 and in Scania with 18.60 per cent. In the middle of Sweden there is also to be found a belt of decided longskulls. Towards the north as well as towards the south the average of the round skulls increases which no doubt has its explanation in the same circumstances which were noted in reference to the variations in the height of the body.

Regarding the *shape of the face* it can be proved that the long, oval type of face certainly predominates. (= 80 per cent.) In the southern provinces how-

* The Swedish Scientest Anders Retzius inaugurated in anthropology, (by which is meant the science of man and mankind and of his place in the scheme of nature), the method of using an index. By an index is meant a number by which the relative size of one dimension in regard to another is expressed.

The index referring to the length and breadth of the skull, which is considered an important race mark, is reckoned in the following manner:

$$\frac{\text{The greatest breadth of the skull} \times 100.}{\text{The greatest length of the skull.}}$$

The numbers one obtains by means of such a division very generally lies between 70—75—80—85. Higher and lower numbers appear more seldom.

One usually arranges the skulls, according to the different index numbers in the following way:

1) Genuine long skulls (Dolichocephali) with an index no: below 75.
2) Medium skulls (Mesocephali) » » » » between 75—80.
3) Round skulls (Brachycephali) » » » » above 80.

It often happens that the long and oval skulls are reckoned as belonging to one group, which is called by the common name of long skulls. (Dolichocephali). The boundary number is 80, as is shown above.

NORDIC TYPES

Fig. 1.

Fig. 2.

Fig. 3.

ever especially in Scania, the round type of face appears more than twice as often. (In about 45 per cent).

The colour of the eyes in 47.4 per cent was blue, in 19.3 per cent grey, in 28.8 per cent mixed, and in 4.5 per cent brown. The colour of the hair was in 23.3 per cent fair, in 52 per cent cendré, in 21.6 per cent brown, in 0.8 per cent black, and in 2.3 per cent red. *Taking into account the blue and grey eyes, and the yellow and cendré hair there is found to be in Sweden 66.7 per cent with light eyes and 75.3 per cent with fair hair.* The southern provinces and East Gothaland show a higher percentage of brown eyes than the rest of Sweden, and in the northern provinces is found a perceptibly higher percentage of eyes of mixed colours. Brown and black hair also reaches a higher number in the north. *More than half of the Swedish population consists of the blonde type. (Light eyes and fair hair.)*

The North European or Nordic (Germanic or Teutonic) race is found to be without comparison the most important constituent in the Swedish nation, for there is more or less Teutonic blood in the veins of the bulk of the people.

The Swede of pure Nordic type is tall and strong. The head and face are relatively long, the complexion fair and ruddy, the hair fair, and the nose most often short and straight.

In Figs 1 to 3 are shown some pure types: (Fig. 1,) a girl from Dalcarlia; (Fig. 2,) a peasant from Södermanland and (Fig. 3,) Jenny Lind, a noble representative of the northern branch. In the Plates I—VII (given in section II) we also find a number of Swedes of the present day of comparatively pure type; on Plates VIII—X are given several Swedish types of different mixed kinds. It is of course of great interest to investigate where, within the bounds of Sweden, the pure Nordic type is to be found in the greatest numbers. If we take as a criterion of the pure Nordic race, (1) genuine long skulls, (with a length-breadth index number up to 75) (2) tall stature, (170 cm. or more) (3) fair hair, (4) light eyes, we find by looking at the chart map, drawn from the Anthropologia Suecica (see also table I) that the average number in Sweden reaches 10.7 per cent. The ligther parts on the map show the provinces in which more than 10

ANTHROPOLOGICAL MAP OF SWEDEN

SHOWING THE DISTRIBUTION OF THE PURE NORDIC TYPE IN DIFFERENT PROVINCES (SE TABLE I).

The light parts in the map comprise the provinces, in which more than 10 per cent of the population show a pure type of this kind. The rest have a more mixed population. The examinations that are the basis of this map and the tables I and II, are made on close upon 45,000 Swedish Conscripts. According to Anthropologia Suecica.

per cent of the inhabitants are of pure Northern blood. These provinces are Södermanland, Närke, West Gothaland (Västergötland), Dalsland, Wärmland, Westmanland, Dalcarlia (Dalarna), Härjedalen and Jämtland. Dalsland shows the maximum with 18.3 per cent. The two provinces in the north (Lappland and Västerbotten) marked with double lines, show the minimum with something over 5 per cent. The inhabitants of those parts are therefore seen to be of very mixed blood. In the horizontally lined parts consisting of Gothland (Gottland), Scania (Skåne), Halland, Blekinge, and Ångermanland there is also to be found a population of very mixed descent. In a lesser degree this can also be said about the vertically lined provinces. Taken on the whole one can say that the parts which lie near to the boundary of Norway show a purer Swedish race than do the northern and southern parts of the country if one excepts Södermanland and Öland.

Table II shows the percentage in which another similar Swedish type of tall stature and fair complexion occurs, but in which the Mesocephali are also included. The average for this type in the whole country is 29 per cent. The maximum occurs in Härjedalen with 41.4 per cent and the minimum in the most northerly parts of Swe-

den (in Lappland and West Bothnia) with 17 per cent. It is easy for the rest to study the numbers given on the table.

Even from the most ancient times our country has been exposed more or less to the immigration of foreign peoples and races. If, for example, one exa-

TABLE I

SHOWING THE OCCURRENCE OF THE PURE NORDIC TYPE IN PER CENT IN DIFFERENT PROVINCES OF SWEDEN.

With pure Nordic type is here meant: 1) Long-headness, (Dolichocephalic type with cephalic index lower than 75); 2) Tall stature (170 cm. or more); 3) Fair hair and 4) Light eyes. According to Anthropologia Suecica.

Provinces	%
Dalsland (maximum)	*18.3*
Södermanland	16.2
Härjedalen	16.0
Dalarna	14.7
Värmland	13.2
Jämtland	12.6
Bohuslän	12.4
Närke	12.0
Västmanland	11.9
Öland	11.6
Västergötland	11.5
Sverige (average)	*10.7*
Gästrikland	10.0
Östergötland	9.8
Medelpad	9.7
Hälsingland	9.0
Småland	9.0
Uppland	8.2
Halland	7.6
Blekinge	7.3
Ångermanland	6.8
Skåne	6.5
Gottland	6.1
Lappland	5.5
Västerbotten (minimum)	*5.1*

TABLE II

SHOWING THE OCCURRENCE OF A SWEDISH TYPE THAT SHOWS THE SAME CHARACTERISTICS AS IN TABLE I, WITH THE EXCEPTION THAT ALSO MESOCEPHALIC HEADS (CEPHALIC INDEX BETWEEN 75 AND 80) ARE INCLUDED.

Provinces	%
Härjedalen (maximum)	*41.4*
Dalsland	36.1
Bohuslän	35.0
Öland	34.6
Västergötland	33.7
Gottland	33.7
Södermanland	33.5
Jämtland	32.2
Värmland	31.6
Västmanland	31.2
Dalarna	31.1
Småland	29.9
Sverige (average)	*29.0*
Närke	28.3
Stockholm	27.9
Uppland	27.3
Skåne	26.9
Halland	25.6
Gästrikland	25.4
Östergötland	25.1
Hälsingland	24.6
Blekinge	24.4
Medelpad	23.6
Ångermanland	22.6
Västerbotten, Lappland (minimum)	*17.0*

mines the composition and origin of our Swedish nobility one often finds families of German, Baltic, English or Scotch descent. Ever since the Middle Ages a not inconsiderable immigration has been taking place of Danes, Norwegians, Germans, Dutchmen, Englishmen and many other nations, who have settled principally in the towns. But these nearly related peoples have not caused essential alterations in the Swedish race-type.

The Finns and the Lapps on the contrary, two races who are considerably different to the Swedes of Nordic type have created a marked difference, for they are to be found in such numbers that they have had a strong influence in certain parts of the country, especially in Norrland and the middle of Sweden.

FINNISH TYPES IN NORRBOTTEN

Fig. 4.

Fig. 5.

Fig. 6.

A very considerable immigration of Finns took place at the end of the sixteenth century and the beginning of the seventeenth. Altogether at that time from twelve to thirteen thousands of Finns at least settled in the middle of Sweden or in the South of Norrland, especially in Wärmland and the counties of Kopparberg and Gäfleborg. Long before this however, a slower more disconnected immigration of Finns had begun to take place, and continued to do so afterwards. They have gradually become incorporated in the Swedish nation. A great many of the serfs to be found in Sweden in olden times belonged almost certainly to the Finnish race. In the most northerly parts of Sweden are to be found about 25,000 so-called Finns, who speak the Finnish language. In spite of this they are for the most part of very mixed descent, which can be ascertained not only by means of genealogical investigation, but also manifests itself in the varying types which appear among them. Part of them is of Finnish, Swedish and Lappish descent, another part of Swedish and Finnish or of Finnish and Lappish descent, etc. The number of persons in Sweden having more or less decided Finnish racial characteristics is of considerable importance. They include in all probability some hundreds of thousands of people.

The Finnish races, that in olden times were especially numerous and who were divided into many different branches, living in a territory stretching from the most northerly part of Scandinavia through Finland and North Russia a good way into Siberia, have by degrees lost their own national peculiarities and have to a large extent become absorbed by other nations, especially by Slavonic races in Russia. The *Tavastlandish* is considered to be one of the most pure of the Finnish races. Such types are not so unusual even among us. *A Finn of this type* is short in stature, thick-set and strongly built. He is fair and, as a rule, has light eyes, his hair is straight and coarse, his complexion is fair and often of a somewhat dirty grey colour; his head is short and fairly broad, as is also his face. This has a square appearance caused by the broadness of the cheeks which extend downwards even to the angle of the lower jaw. The nose is very clumsy with a concave-brigde. Figs. 4 to 6 show us some Finnish types in Sweden, as do also the pictures on Plates XI—XIII, mixed types on Plate XIV.

LAPPS

Fig. 7.

Fig. 8.

Fig. 9.

Although they all have certain features in common, Karelians Savolaxians, Esthonians with other, Finnish races of more adulterated blood, deviate from the type described above in a more or less degree. These races are also represented in our own country. But this is not the right place to consider these differences.

The Lapps have come to Sweden from the east, certainly before the beginning of the Christian Era, and have since spread out gradually towards the south as far as to the northern part of Dalcarlia. Probably the Lapps have never, at any time, been a numerous nation. At the present time their numbers hardly reach to 30,000 of which about 7,000 are found in Sweden, about 20,000 in Norway and the remaining few thousands in Finland and the Kola peninsula in Russia. The greatest number of the Swedish Lapps, about 3,500 live in the most northern province of Sweden (Norrbotten).

The Lappish race differs very considerably from both the Finnish and the North European Race.

The Lapp is of very low stature (the men measure about 155 cm. in height) his hair is dark, most often black or blackish-brown, lank and coarse; his beard is of very weak growth, his eyes are brown, his complexion has a tint of yellow-brown in it; he has a short skull with an index number of about 84; his face is broad and short, with projecting eyebrows and a small lower jaw narrowing off downwards; his nose is often concave. Figures 7 to 9 represent typical Lapps from North Bothnia, as do also Plates XV—XVII. Mixed types occur, and not so seldom, among the Lapps which seem to indicate that they have received an infusion of both Swedish and Finnish blood. (See Plate XVIII).

The colour of the eyes as well as the index number of the skull is an important race-mark. One knows that it is inherited and that the possession of blue eyes is of a recessiv nature.

The diagram on side 32 shows the division of different colours of the eye into three shades, light, dark-medleys (= mixed) and brown, among Swedish, Finnish, and Lappish speaking populations, according to my own, not yet published investigations. The light eyes appear in predominating numbers among the Swedish population and even among the Finnish in Norrbotten. Among the

FOREIGN TYPES

Fig. 10.
Swedish jew.

Fig. 11.
Swedish Walloon.

Fig. 12.
Gipsy-woman.

Lapps on the contrary they appear more seldom. The brown colour of the eyes is usual and appears most often among the Lapps and comparatively seldom among the Swedes and Finns.

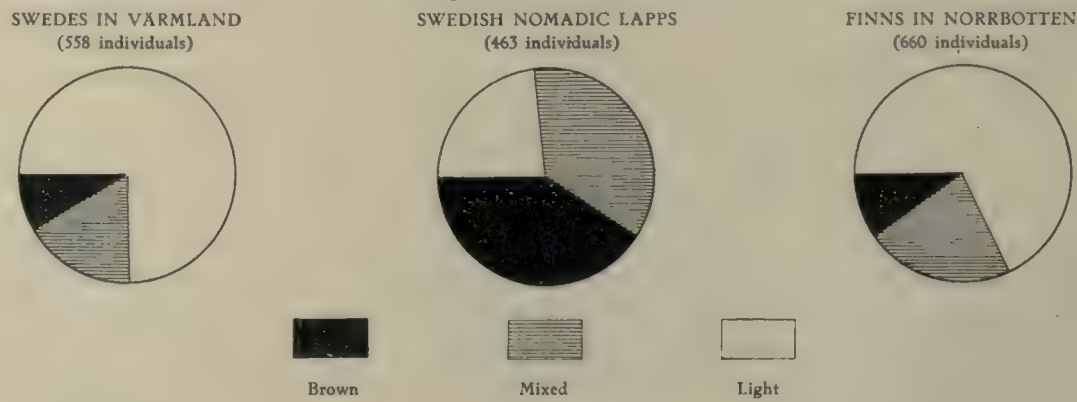
The mixed eyes are not frequent among the Lapps and in a still smaller degree among the Finns and least of all among the Swedes. For more particulars see the diagram itself.

Smaller groups of other races besides these three chief components, the Nordic, the Finnish and the Lappish races, appear also in Sweden; they may be summarised briefly.

Walloons came from Belgium during the seventeenth century to improve the Swedish iron industry. They settled near the great ironworks in East Gothaland (Östergötland), Uppland, Värmland and Bergslagen. They are represented mostly by a dark type. Even they are for the most part of short stature, thick-set growth,

DIAGRAM CONCERNING THE DISTRIBUTION OF DIFFERENT COLOURED EYES AMONG DIFFERENT RACE-GROUPS IN SWEDEN.

The examinations, performed by the author, comprise *all* persons, of both sexes and of all ages, living in a certain district.



and have broad faces. (See Fig. 11). They have intermarried partly among themselves and partly with Swedes, and owing to this a great many mixed types have arisen. (See Plates XIX–XX). The descendants of these Walloons who have now spread themselves over the whole country, probably amount some tens of thousands.

The Jews are another foreign race who began to settle in Sweden during the latter part of the eighteenth century. They consist of only a few thousand. The same remarks apply to them as to the Walloons, some of them preserve the purity of the race, while others intermarry with the Swedes. The Swedish Jews stand in a relatively, high position. Fig. 10 shows a Jew of pure type.

Lastly we must mention that there are a smaller number of *gipsies* (Fig. 12) to be found in Sweden.

The so-called Tattars often the offspring of gipsies are to be found at the present time in many parts of the country. They are unfortunately in no slight degree criminally disposed proletarians of very mixed origin.

The presence of these foreign races as well as the continual influx of people of different nations cannot be without importance to the character of our race both from a biological as well as a cultural point of view. They are not entirely favourable.

* * *

The Swedish nations whole numbers are beetwen 7, and 8 millions of people, of which about 6 millions are found in Sweden, 370,000 in Finland and something more than 100,000 in other European countries. Rather more than a million have found new homes in America, the principal number of these in U. S. A. It is a remarkable circumstance that Swedes who have emigrated to America and Western Europe and very soon become absorbed in and mixed with their hosts, contrary to Finns and Russians, build a national unit which tenaciously retains its vital power for hundreds of years and more.

THE SWEDISH NATIONAL-CHARACTER

SCATTERED THOUGTS AND APHORISMS FROM DIFFERENT SOURCES

BY

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»HOW CAN SUCH A HARD NATION HOLD SO MUCH OF tenderness and feeling in its soul», a Japanese is said to have uttered once, and stirred by emotion he burst into tears, as he listened to a selection of our most beautiful folk-songs, sung by Swedes. He had lived under the impression that the Swedes were hard and brutal. Their reputation as dauntless warriors was probably not unknown to him. Perhaps he had read of their courage, bravery, heroic self-sacrifice, silent self-denial, modest fulfilment of duty, all martial virtues. Perhaps he had noticed that a certain coarseness can still be found among them, a disposition towards fighting and a strong desire for spirits, which he also interpreted as being an inheritance from the old war times. Now he sees, opening before him, a whole world, showing the sweet, serene, open temper of the Swedes, which they usually hide behind a veil of bashfulness.

»The Swede is a curious mixture of idealism and realism, of sentimentality and hardness. This is connected with his power of imagination. He is a realist and can be hard-hearted when it is a question of something he has just in front of him, but he is an idealist and can be sentimental in regard to things he can only see at a distance.» (G. Sundbärg).

Undoubtedly there is found, in the depths of our people's character, much that is beautiful, gentle and dreaming.

Another quality which the Swedes, as soldiers, have had an opportunity of showing, or perhaps in spite of their war-like qualities, is their chivabrousness. »Vincere scis, Suecia, victoria uti nescis.» (Thou knowest how to conquer, Sweden, but not how to profit by thy conquest). A pronounced humanity is one of the principal traits of the Swedish character. No one has ever been more forbearing towards a beaten foe, no one has ever found it easier to forget an injury. One might with more reason, rather reproach the Swedes for unnecessary pliability. It is very significant in this connection that the inhabitants who live on the boundaries to the north, the west and the south, which are inhabited by other races, and the inhabitants of the provinces which have belonged to neighbouring nations, are heartily desirous of belonging to Sweden.

The Swede possesses also in a large measure, »the noble integrity, which is one of society's firmest foundations, and which many times mitigates the consequences of an, in itself, imperfect social order». (G. Sundbärg). One can depend

upon the word of a Swede and his word of honour is often more sacred than an oath. Many of our proverbs have reference to just this inherent sense of honour and faithfulness to one's word. Foreigners not seldom, lay stress upon this. »The Swedish spirit always strives after justice. It is this which, at one and the same time, constitutes its strength and causes its lack of warmth». (André Bellesort).

»One cannot think of any land, where equity of law, exists in so high a degree», says the same author. »The Swedes' obedience to the law and their special sense of duty, make them very welcome every where.» (Heidenstam).

Another manifestation of the same humanity is the Swedes' pronounced reluctance to dogmatics of every kind. Moral justice in Sweden has more weight than legal justice has.

»The aristocratic trait is strongly developed in Sweden, both in a good and bad sense. One of the strangest forms it takes is the Swede's dislike to defend himself against agression. It is not considered »good form» to defend oneself». (Sundbärg). Selfish advocacy of a thing is, as a rule, judged very severely.

The power of organization possessed by the Swedes, is another unquestionable element in their character. This appears throughout all Swedish history and is seen in the activity of the guilds and other corporations that have always existed. The ancient statue, »By law shall the land de built», is no empty word. It expresses itself in every direction and in many ways. Everywhere the Swede will set in order, straighten up, and put things tidy. He cannot thrive amid disorder. Even in detail he likes to catalogue and label everything that comes to his hand. One only needs to mention such names as Carl von Linné (Linnæus), Berzelius, Hazelius, and many, many others, who have set to work bringing order in several directions. »A place for everything, and everything in its place», is a Swedish proverb which the Swedes literally obey. »When one has lived in Sweden, every other land one àfterwards may visit, strikes one as being disorderly and dirty.» (Professor René Bellanger). It can probably be said, that, in no other land does associated life blossom so freely as it does in Sweden. This holds true respecting sport, temperance societies, the promoting of lectures, etc.

The Swedes' gift of equipoise, no matter what position in society his work gives him, stands in connection with this. He can fill his place as a leader without domineering, and he can fill a subordinate place without cringing. He is a pattern, both as master and man. Swedes, with some Finnish blood are, as a rule, more defiant and less submissive to discipline.

»As the born organizer and leader, the Swede is active in disposition. He loves to throw himself into a new enterprise, to think out new plans, to change his business and place of living, to look around him and utilize all the possibilities in other places and in foreign lands.» (Are Wærland). The temper of the Vikings is still to be found, even today, with many Swedes. They love adventure for its own sake. »When carrying out a new enterprise, the Swede at first is very enthusiastic, but he is lacking in perseverance and energy; he is often tired when the thing is half done. That is why so much is only half done here in Sweden». (Tegnér). His capacity for action cannot confine itself to one direction,

where he might easily become a power, but he splits his strength and his interest among many things and so becomes »jack-of-all-trades, master in none», although this must be taken with a certain amount of reservation.

The Swedes' ready courtesy, hospitality and polite manners are widely known. — »The Frenchmen of the North» — But this quality can be exaggerated and has reverse side too. They love festivity and splendour, which often launches out into luxury, ostentation and theatrical arrangements, scarcely answering to the intrinsic value. »They often clothe themselves in the richest manner, although they live in a poor way.» (Jordanes, in the sixth century). Taking all classes into consideration one can say about the Swedes, even today, that they both dress well and carry themselves well.

»Honour stands foremost in the Swedish mind.» (Tegnér). »The Swedes are distinctly a governing race, with greater desire to rule and lead than to work.» No matter how unpretentious a Swede's place may be in society, he still loves to break loose and play the gentleman. This points to a certain carelessness and tendency to live for the present moment, from which we cannot exonerate him. He likes to pose as being more than he is. »To avoid the least suspicion of seeming mean, the Swede scatters profusely both his own and other people's money, to the right and the left.» (Are Wærland). »The Swede can both work well and save his money, but for the most part he spends all he has saved. His goal, when he works, is not to improve his position, but to have money to spend; he saves to throw away, and very often without any pleasure or any purpose.» (C. J. L. Almqvist).

But in spite of this the Swede is rather dull and heavy in society. He has a tendency to settle every thing according to a scheme he has in his own mind, and judges everything in a rather superficial manner. This makes him, even among strangers, feel awkward and absent-minded. »When he is working, the Swede generally has a kind and humane manner, but he is all the more wearisome when one meets him afterwards in society.» (Carl Laurin). »With us nearly everything is equally tiresome and commonplace. Always the same general system, never anything that takes the individual into consideration.» (Sundbärg).

The home-life, taken on the whole exhibits the same features. The Swede has so little to give. His mind is directed to outward things. »The relation, which warmly and sincerely binds father to son, and mother to daughter, under all the changes of life, and makes of them almost one spirit, is not seen very much in Sweden.» (Are Wærland). In regard to a desire for knowledge and interest in education the inhabitants of Sweden probably stand highest in the world. General elementary education in the whole country is, with us, of an older date than anywhere else. The state grants a larger sum, in comparison to the number of its inhabitants, to be spent on elementary education than is the case in any other country. Practically one can say, that there are none who cannot read in Sweden, if one excepts idiots and imbeciles, whom it is not possible to educate, and whose percentage in our country is fairly low. Public Libraries, where books can be borrowed free of charge, are to be found, not only in the towns but in every larger place in the country. The scheme of lectures

is not to be beaten anywhere, neither as regards organisation, nor in regard to the interest shown by the public.

Hand in hand with the active courageous temper of the Swedes is found a strong independent feeling. »The Swedes are a self-willed people, ready to do great deeds.» (Gustavus Vasa). »Our pride remains the same, from age to age, through all our changing fate.» (Tegnér). This strongly developed feeling of one's own strength, one's own worth, leads all to easily to an over-estimation of one-self, the consequence of which is, that one sometimes tries to assert oneself at the expense of others. The naive self-admiration that one often meets with, and that among country people is called bragging, is very common among the Swedes. It may be an expression of their frankness. But when he boasts of his own personal merits, both in season and out of season, very often laying stress upon the incapacity of his fellow-men, then the Swede is not attractive. This quality often leads to the envy, that flourishes in many parts of Sweden and has even received the epithet, »Royal Swedish».

This quality does not prevent the Swedes from being among the first in all the world, to give a helping hand to their suffering and distressed fellow-men. Let there be a failure in the crops in a part of the country, let there be a family struck by misfortune and help committees are started at once, and both rich and poor are not afraid of making every sacrifice to give aid to those in need. It has happened more than once, that a family in need, thanks to the unselfish aid given by others, has not only been saved from ruin at the time, but has been placed in a better economical position than it occupied before the misfortune happened. Sweden's leading position in the work of the Red Cross Society, »Save the children», and other international aid societies is well known, and val-ued as it deserves. The sympathy, charity and high ideals of our officials has also given them a very high reputation. These occupy, not only in respect to their intellectual reputation, but also in respect to a broad humanity, a position that singles them out, to their advantage, from the officials of many other countries. The unwritten history of the deeds done by Swedish doctors and priests, would present numberless proofs of the greatness and nobility, unsel-fishness and self-sacrifice, faithfulness and conscientiousness, which in silence, without advertisment, as a matter of course, have been and are still being exhibited, in the service of mankind. The justice administered by Swedish judges is also raised above all doubt.

»The trait lying deepest in the character of the Swedish people, and which to a large extent explains their nature, is their strong love of Nature.» (Sundbärg). This explains their disposition towards and love of natural-history and geographi-cal investigations, and their reputation as a nation standing above all others in the fields of invention and exploration; this worship of Nature is also expressed in the mildness of the Swede's temper, his dreams, and his changing moods. It meets us in the best and deepest of Swedish poetry, in its finest and most deli-cate blossoms, the Swedish folk-songs; in a word, in everything where the Swe-dish imagination, with unclipped wing can take its flight. In contradiction to this the Swede has no sharp eye or power of observation for the differences to be found in the spiritual life of mankind. He is a mediocre and uninterested psycho-

logist. This can be proved in several spheres of life, not least when he wishes to show what he can do as a business man. There are Swedes, and not so few either, who look wellnigh with contempt on everything that can be called business. It does not appeal to his unselfish disposition and ideal nature. This may be a fault or a merit in his character. It is certain that many a great deed and noble work would never have been done in our country, if the »economical sense» had been as strongly developed with us, as in some other nations. A lack of flexibility in the spiritual life, a want of knowledge of its finer shades, is apparent in the Swede, when he tries to characterise other people. He often draws in black and white. In the spiritual life we lack the shades that come between.

The intellect of the Swede is alert in nearly every sphere of life. He is blessed by Nature with great intelligence. He can easily understand and absorb new ideas and even initiate new lines of thought. He is both receptive and productive, perhaps at the latter, he is stronger than any one else.

It has been asserted, that one of the Swedes' greatest faults lies in »their lack of national temperament» (Sundbärg), but such an assertion certainly rests on very weak ground. When Sweden's existence has been threatened by external or internal enemies the Swedish people have given proof of possessing both a national temper and the instinct of self-preservation. »We have toiled, we have hungered, we have frozen to protect the land, that has always been our own. During this strife for Sweden and its welfare, the Swedes have grown-up to become a nation of gentry. The nature of slaves has no place in our people. Neither with rich or poor, high or low.» (E. Trygger).

Lastly, it may be sufficient to say, that Sweden is the oldest independent kingdom in Europe. High-minded deeds hawe been accomplished by Swedes in all times, to the advantage and glory of their own native land.

ANTHROPOLOGICAL AND RACE-BIOLOGICAL RESEARCHES IN SWEDEN

BY

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ANTHROPOLOGY, THE SCIENCE OF MAN, IN ITS WIDEST SENSE includes in its scope the whole essence of man. In the following description, however, it is only intended to consider the somatical anthropology, the science telling of the bodily qualities of the human being with the history of his origin and development, together with that of the human species.

Several other branches of science that are nearly connected with this must also be considered here, first of all race-biology, ethnography, and archæology. *Race-biology* treats of the life of families, peoples and races. It employs itself with all the factors — favourable or unfavourable — that are able to influence and alter the primitive species or race conditions in given groups of human beings. Thus it is not interested in the first place in the generations living now, but has the task of inquiring into the connection between the different generations. On account of this it is clear that hereditary investigation must play a very dominant part in its work.

Ethnology (Ethnography) treats of the human being as a member of society. It employs itself with the structure of society, with the occupations, language and conception of religion among different peoples at different periods of time, with their tools, dwelling-places, clothes and such things.

Archæology, the science of antiquarian research, employs itself in investigating the remains of tools, ornaments, graves, dwelling-places etc. belonging to people in pre-historical times.

Already in Hippocrates, Aristotle, and Galenus together with many other naturalists from ancient times, we find a great deal of anthropological information which is both interesting and of a certain amount of value, and by means of the great geographical discoveries in the 15th century the area of anthropological knowledge was expanded to a large degree. But it was first through the great naturalists of the 18th century that anthropology began to take a more scientific form.

The general scientific foundation was laid by the Swede, CARL VON LINNÉ (Linnæus) (1707—1778), who in his work »Systema Naturæ» (1735) partly placed mankind in its position among Primates, and undertook a classification of the races of humanity on the ground of their physical, mental, physiological and moral characteristics, their geographical distribution etc. He distinguished Homo Americanus, Europæus, Asiaticus, Africanus, and Homo monstrosus, a group of less known human types, described in a more or less fantastic manner.

At the end of the 18th and beginning of the 19th century Gall and Spurzheim appeared, as is well-known, with their cranioscopy and phrenology, and thereby directed the anthropological interest towards the human cranium. It seems

partly to have been this which influenced here in Sweden the eminent anatomist Anders Retzius (1796—1860) and tempted him especially to make craniology the object of a profound investigation. By means of the work Anders Retzius afterwards achieved in this field he has given anthropology a firm foundation, systematized it and given it exact methods of investigation and study which have since been used in nearly all anthropological researches.

There were 3 methods he chiefly employed, the metrical, the typological and the historical. It was just these means that afterwards showed themselves to be of such unprecedented importance in bearing fruit as regards anthropology, and it is thanks to them that anthropology from the modest position it held, when Anders Retzius began his work, has been capable of swinging itself up to the high position and the imposing dimensions it takes now.

Especially momentous and important were the means of help he gave to the study of anthropology by the introduction of the *index*-number, that is, the expression of the relation between certain dimensions of the skull by means of numbers, for that has now become an indispensable means for the clearing up and deciding objectively the distinguishing marks in the objects compared. Anders Retzius used it first to make plain the difference in form, which the craniums present when they are surveyed from a crown view. For this reason he measured 1) the greatest length, and 2) the greatest breadth of the cranium, and combined these measurements in the following relation in numbers: —

the greatest length : the greatest breadth = 100 : x.

By this means he gained the so-called *length-breadth-index* of the cranium and thus won firm ground for their division, supported by which he carried out his well-known classification of craniums into

longheads or dolichocephals
shortheads or brachycephals.

(Dolichocephals with an average index of 75 and brachycephals with one of 83.7.) By the use of such an index-number it became possible for him to show in an objective manner the essential shape and differences in the structure of the skull, which are to be found among nations and races, for example between the craniums of the Swedes, Finns, and Lapps, as well as between those of Lapps and Esquimos, etc. See his work: — »On the shape of the craniums of the Northern peoples», which lays the foundation for modern anthropology.

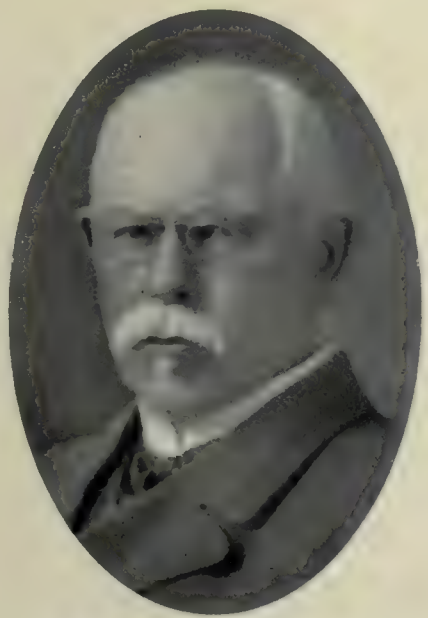
He asserted in the meanwhile that both dolichocephals and brachycephals were to be found in all the continents with the exception of Africa, and the existence of intermediate forms was by no means unfamiliar to him, although he did not as yet feel it necessary to place them in a special group.

In his classification he combined also the shape of the cranium with that of the jaws, and in this manner he created the well-known system of dividing the human-races as: 1) prognathous, and 2) orthognathous, i. e. with projecting and non-projecting jaws, as sub-classes in both the dolichocephalic and brachycephalic groups.

The system and the methods of study introduced by Anders Retzius, are still the living principles in all anthropological research and continue to win a more extended application, so that without exaggeration, it may be said, that he is the creator of scientific anthropology as it is known at the present day.

ELLEN KEY.
Authoress, Alvastra.

BARONESS EBBA PALMSTIERNA.
Wife of the Swedish ambassador in London.



PROFESSOR FRITIOF LENNMALM.
Neurologist, Rector of the »Karolinska Institutet», Stockholm.
* 21/9 1858.

PROFESSOR HERMAN LUNDBORG.
Race-biologist, Uppsala.
* 7/4 1868.

The successor of Anders Retzius in the professorship of anatomy at the Caroline Medico-Chirurgical Institute (in Stockholm) Baron Gustaf von Düben (1822—1862) also took great interest in anthropology. His best-known works in this field of labour are »Sur les caractères craniologiques de l'homme préhistorique en Suède», (Compte rendu de la 7 session du Congrès préhistorique à Stockholm 1874), and his ethnographical monograph »On Lappland and the Lapps» (Stockholm 1873). His anthropological work on the Lapps which he rested chiefly on the basis of the Lapp craniums and skeletons collected by Anders Retzius and himself, was given out first, however, after his death by professor C. G. Santesson under the title: »Crania Lapponica». Stockholm 1910.

With the appearance of Gustaf Retzius, son of Anders Retzius, the anthropological research in Sweden began to flourish once more.

Gustaf Retzius (1842—1919) published as early as 1864 a German edition of his father's collected anthropological works. Since then he has published a large number of comparatively speaking smaller pamphlets and essays; but chiefly through the four monumental folio works: »Finska Kranier» (1878), »Das Menschen hirn» (1896), »Crania Suecica» (1900), and also, together with C. M. Fürst, »Anthropologia Suecica» (1902), he has won a place for himself among the most remarkable anthropologists of our time. In the first mentioned work he treats of the physical qualities of the tribes or branches of races dwelling in Finland itself: Tavastians, Karelians, and Savolakians, and gives also an exposition of the mutual relationship between these tribes, their wanderings and expansion, their culture both now and in ancient times, their manners and customs, their tools and dress. This important and within its own sphere pioneer publication is founded partly on the results of expeditions to Finland, performed by Gustaf Retzius, Christian Lovén and Erik Nordensson 1873. I regard to anthropology, Gustaf Retzius distinguished two fundamental types within the area investigated, namely the *Tavastian* of medium height, with fair hair and brachycephalic head with a broad face, and the *Karelian* of less than medium height and likewise of less brachycephalic type than the Tavastian, with a narrow face and dark chestnut hair.

In »Crania Suecica antiqua» Gustaf Retzius in the most excellent pictures has preserved for the coming ages the remains which have been found of Sweden's primitive inhabitants. This work, according to Kollmann, possesses the same universal importance respecting knowledge of the European human species, surveyed from the stand-point of race-anatomy, as does His' and Rütimeyer's »Crania helvetica», Studer's and Bannwart's: »Crania Helvetica antiqua», Davis' and Thurnam's works on the primitive English craniums and also Quatrefages' and Hamy's work on the primitive French craniums. But the importance of this work lies, as Kollmann also shows, not only in the fact that by means of pictures of natural size it makes the defective remains of the first inhabitants of Sweden accessible to the wide circle of all the cultured nations, but it is also to be sought in the scientific result regarding the anthropological characteristics of our forefathers, which Gustaf Retzius reached through the anthropological study of the material in question. This result Retzius himself has given in the following words:

»The people of the stone age certainly in regard to anthropology did not form a pure race, but were still in a preponderating degree dolichocephalic, although

with a strong admixture of mesocephals, but only a slight addition of brachycephals. (Crania Suecica antiqua page 162.) During the time of transition from the stone age to the bronze age and during the first periods of the latter the inhabitants in regard to anthropology did not either form a pure race, but were still for the most part dolichocephalic, and showed only a small admixture of meso- and brachycephals. (Crania Suecica antiqua page 170.) During the iron age also the inhabitants were not either a pure unmixed race, but formed a mixture of pure dolichocephals, meso-dolichocephals and brachycephals. The pure dolichocephals were however the preponderating type. (Crania Suecica antiqua page 172.) Crania suecica antiqua is therefore in the highest degree, according to Kollmann, a most important support for the conclusion respecting the constancy of the ancient races, towards which for the rest all the facts of the craniology point more and more decidedly.

Anthropologia Suecica has a previous history: On the initiative of Gustaf Retzius the Anthropological Society was founded in Stockholm, March 15th 1873, and already in 1875 it began to give out the »Journal of Anthropology and Culture-history». After the return of A. E. Nordenskiold from his voyage in the Vega, the society was expanded to include geography also and was now named: »The Swedish Anthropological and Geographical Society», and its organ was now called »Ymer, a journal published by the Swedish Anthropological and Geographical Society». Within this society the thought was adopted of bringing about a comprehensive statistical-anthropological investigation regarding the Swedish people in the same way as had been done in several other countries with lively interest. Gustaf Retzius had already in 1862 and 1863 planned and even begun such an investigation, but was obliged to postpone the work.

»In the year 1888 the Archæologist Dr. Hans Hildebrand emphasized strongly that such an investigation ought to be made in this country. But it was first in 1896 that the thought came to the surface. Dr. Vilh. Hultkrantz then made the proposal that the statistical-anthropological investigation in question should be started. Dr. Hultkrantz and Professor Retzius were entrusted with the task of preparing the question. The Government was petitioned to allow an anthropological investigation to be made on the conscripts of Sweden. Arrangements were made with several younger colleagues, professors, physicians and doctors, who were initiated ready for the work, and in the years 1897 and 1898 the investigation took place. The whole contingent of the conscripts for both those years, about 45,000 men altogether of the age of 21 years, were then measured and examined according to the following plan: place of birth: that of the young man as well as that of his father and mother, height of the body in standing and sitting position; breadth of embrace: from finger-tip to finger-tip; skull: greatest length (Glabella-occ.) and greatest breadth; type of face: oval or round; colour of the eyes: blue, grey, mixed, or brown; colour of the hair: yellow, cendré, brown, black or red.» (Anthrop. Suec. page 3—8).

»The arrangement and study of the material which had been collected from all parts of Sweden was carried out by G. Retzius and Carl M. Fürst, G. Retzius taking upon himself the working up of the measurements, and Carl M. Fürst the task respecting the colour of the eyes and hair, after which in collaboration they

made comparisons, calculations and a general survey of the whole.» (Op. cit. page 12). The work was ready in the year 1902.

These ample statistical examinations are, according to KOLLMANN, of enormous bearing in the matter. They constitute a fundamental basis for the whole science of the races of mankind. They not only give a complete statement of the anthropological characteristics of the Swedes but even explain the anthropology of the German type, and if one places them in combination with the »Crania Suecica antiqua» of Gustaf Retzius they have established the following facts, which Kollmann calls »the giant results»:

1st. The Swedes of our own times show us a picture of the old Germans;

2nd. The Swedish people is made up of several races;

3rd. These races ever since the stone age have shown the same unchangeable constancy to type.

In his fourth work »Das Menschenhirn» Gustaf Retzius has sought to elucidate the macroscopical morphology of the human brain, and its embroyonical development. As the material of pictures is especially copious, and is presented with the greatest fidelity to nature, it gives a good insight into the wealth of variation which the configuration of the surface of the brain shows. And Gustaf Retzius has in this work given us the most perfect and exact elucidation of the brain of mankind, and especially of that of the Germanic tribes, which is to be found in literature. Without doubt in regard to the morphology of the brain, as Gustaf Retzius himself says, a plentiful and as for as possible exact rendering in pictures of what has been observed is above all things of great importance. Kollmann also in speaking of this work says, that just through these qualities and the accurate and extensive study of the variation, it will be a base for the study of morphology, and race-anthropology during all time.

Through his other anthropological writings G. Retzius has contributed to the unravelling of a great many dissimilar questions, such as the connection between the cranium and morphology of the brain and the intellectual powers, the anatomy of the Lappic brain, trepanation in pre-historical times, the artificial deformations af the cranium, etc. G. Retzius' popular work »On the most ancient trace of mankind's existence on the earth» (1873), which in a great measure is grounded on his own observations at the places of discovery, gives a good idea of the stand-point of palæo-anthropology at that time. It has helped in a high degree in awakening interest for anthropology in wide circles. And Retzius has even in many other ways with praiseworthy self-sacrifice and magnificent liberality supported and advanced anthropological research in Sweden.

C. M. FÜRST as before mentioned has taken a very active part in the great work »Anthropologia Suecica». He has also in collaboration with Professor Fr. C. C. Hansen (Copenhagen) published the great monograph »Crania Groenlandica» (1915) which contains a richly and beautifully illustrated description of 380 Greenland Esquimo craniums. From this is seen among other things that »the Greenland Esquimos is one of the most dolichocephalic peoples that live or have lived on the earth in historical times. The average Length-Breadth-index is for men 70.67 and for women 72». He has also in a number of other writings thrown light upon the anthropological characteristics of the Swedish people, in doing which he even

observed with interest its ethnology and archæology. The craniology of the stone age and that of the iron age are touched upon in several of his works (»Ymer» 1905, Proceed. of »Swedish Acad. of Sci.» 1912, »Fornforskaren» 1920, 1911, 1914 and others). He has described several cases of trepanation in olden times (1913, 1917 etc.) and also a case of scalping during the stone age (1919). C. M. Fürst especially has done good service in the preservation of large numbers of valuable objects found in ancient graves, and in describing and interpreting the Swedish anthropological material from pre-historical and historical times, and a great deal of the discoveries and observations he thereby made, he has told us comprehensively in the interesting book »When the dead bear witness» (1920). His plastic reconstructions of the cranium are also of great interest, and his index-tables, as well as his valuable measuring instruments (craniophore, trigonometer) are a good means of help in anthropological research work.

J. Vilh. Hultkrantz, as before said, has also taken an active part in the great work »Anthropologia suecica» (1897—98). But he had already before this performed a very comprehensive anthropological investigation respecting the »Stature of the Swedes» (»Ymer» 1896). »The material for this consisted of the tabular reports of the stature of the conscripts, which for the years 1887—1894 had been sent in from the 31 enrolment districts of the kingdom to the War Department, and included 232,367 individuals of 21 years of age. According to these reports and Hultkrantz' reckoning the average height of Swedish men at 21 years of age is 169.51 cm.» Hultkrantz added to this a summary of the stature in different provinces as well as some studies in the colour of the eyes and hair. Besides these anthropological studies of the Swedes, Hultkrantz has also made such studies over some South American tribes, viz. the Ona and the Yahgan Indians, a work, which among other things on account of its technically critical treatment of the measurements of the long bones has attained a very remarkable position in the foreign anthropological literature, equal to that of Lehmann-Nitsches fundamental investigations. His inquiries regarding the in many respects remarkable disturbance in the formation of the skeleton, which he named Dysostosis cleido-cranialis are also of great value.

The anthropology of Sweden during the Middle Ages has been elucidated by another Swedish scientist, the eminent Uppsala anatomist Edvard Clason, who by his work added yet another link in the chain of evidence that the same Germanic tribe, which now inhabits this country had during the Middle Ages as well as in earlier times, its dwelling-place here. Besides this it is seen from his investigations, that the Germanic tribe even during the middle ages could not be looked upon as one race but must be considered as being composed of at least two races. Like Kollmann, Clason is inclined to lay great weight upon the facial cranium in regard to comparative anthropology.

Edward Clason deserves at the same time to be remembered as the real creator of the *Anthropological-anatomical Museum of the Anatomical Institution in Uppsala*, the largest in Sweden. By means of untiring diligence and the most unsparing labour, he has here collected material of inestimable value. In the same way the principal part of the honour of founding the anthropological department in the *Anatomical Museum in Lund* belongs to C. M. Fürst. The museum of the *Caroline Institute in Stockholm*, which is especially valuable from the stand-point of

comparative anthropology, is chiefly the work of Anders and Gustaf Retzius and Professor Albert Lindström.

Even the general European palæoanthropology has been considered with great interest here in Sweden. Among others GASTON BACKMAN, at present professor in Riga, has by means of diligent authorship helped in spreading and promoting this interest among wide circles, and his meritorious, richly illustrated representation of this subject in »The Pre-history of Mankind», Stockholm 1911, may be specially mentioned. Another of his works »From the history of somatical anthropology» (Ymer 1910), from which a great deal of the information given here is taken may also be mentioned, G. Backman has also through his typological studies (over the shapes of the cranium etc.) and by several anthropological measuring intruments (tropometer, goniometer) further advanced anthropology in Sweden.

Lastly perhaps something may be said on the result of the investigations in the most ancient of the palæoanthropology which the *under-signed* has made during recent years. They have been carried out with the idea of examining into the reliability of the sensational discoveries »Pithecanthropos» and »Eoanthropos» which are supposed to represent »the missing link» and are interpreted as being transition forms between the chimpanzee and man. But if both these interpretations were correct, the anthropogenesis must in these transitions have followed different ways, contrary to each other. For according to »Pithecanthropos» the *lower extremities* must first have reached the high human stage of evolution with upright walk etc., while the skull is still of pure chimpanzee type, while on the other hand according to »Eoanthropos» the *brain and skull* must first have reached the human stage and afterwards gradually the other parts of the body. By means of detailed examinations of the parts of the discoveries and extensive studies of the skeletons in a great deal of comparative material, especially teeth, together with a comparison of the results of the Vobz- and Selenka-expeditions to Java and their renewed examinations of the strata where the fossils had been found, it has been shown in my examination that the discoveries in question do not in reality give the support to the above mentioned interpretation one believed. This is all the more clear as both discoveries are plainly *composed of typical chimpanzee fossil* and *similarly typical human fossil*, the latter most nearly of Aurignac-type, that is of the human race which seems to have wandered in the deluvial period from the East into Europe.

By request I add a plate from the »Eoanthropos»-examination, which shows that the teeth [two molar teeth, M_1 and M_2] in the chimpanzee-jaw, that was found at Piltdown (England), are not »human», but chimpanzee-teeth.

The upper figure is a photograph of the Piltdown »Eoanthropos» jaw.

The middle » » » drawing of the same.

The lower » » » photograph of the lower jaw of a chimpanzee.

The discoverers asserted that the teeth of the Piltdown-jaw were »distinctly human»; and according to their opinion they should prove that »Eoanthropos» was an intermediate form between chimpanzees and human beings. But in reality they are in their structure fully in correspondence with the chimpanzee teeth. Also the *whole* jaw together with the teeth shows the chimpanzee type. There is then no reason for connecting this jaw with the admittedly human skull

which (together with many other both tertiary and quarternary animal fossils) was found in the sand at Piltdown.

The results of my examinations are to be found more completely published in »Der Piltdown-Fund» in Bull. of Geol. Inst. Uppsala 1919.

As before said anthropology has many points of connection with other subjects, e. g. anatomy, röntgenology, ethnography etc. But many of the contributions that have been made in these branches of science cannot be treated of here for lack of space.

The beautiful studies and work which have been done by Dr. Victor Berglund in inventing methods for the reconstruction of the profile of the cranium on the skeleton of the face (Lund 1914) ought however to be mentioned. And it should be said also that in Professor K. B. Wiklund of Uppsala, Sweden possesses not only an eminent Finnish-Ugric linguist but also a genuine expert especially in Lappic ethnography.

Even in Finland: important anthropological researches have been made by Finland-Swedes. These have not however been mentioned above, because an account of them will be found in a later article by Dr. K. Hildén.

* * *

Lastly in regard to the latest systems started, genetics and race-biology, even these have been pushed forward strenuously by Swedish scientists.

It is quite natural that at the change of the century when the Mendelian laws were re-discovered, biologists, especially botanists threw themselves into this interesting sphere of labour. In another part of this book (see page 101) is given an account of the contributions made by Swedish experimental geneticists and cytologists.

This is the place to mention something about the race-biology which rests on a medical and anthropological foundation.

There is only one scientist in this field of labour at present in Sweden, namely, H. Lundborg in Uppsala.

He has during many years with rare zeal devoted himself to researches in

race-biology and done it with so much success that the authorities in the State have now considered the time ripe to found a Swedish Race-biological Institution under his direction (see an account of this page 48).

Already in 1899 we find an article in Hygiea on myoclonus in families, in which quarter his interest lies. He describes there this uncommon and peculiar disease, which has since received the name of myoclonus-epilepsy, and is only found in one place in the south of Sweden. During the years which followed he drew attention to it in several treatises, among them being a monograph »Die progressive Myoclonus-Epilepsie» (1903). In the years 1908 he again took up the investigations and then thoroughly examined the large and at present degenerated farmer family in which many cases of the above mentioned disease have appeared. The result of five years work in this district was presented by Lundborg in an important work: »Medizinisch-biologische Familienforschungen innerhalt eines 2,232 köpfigen Bauerngeschlechtes in Schweden» (Text u. Atlas, Jena 1913). This work which has won recognition among experts in every country is the most complete family investigation, built on medical-genealogical grounds which, taken as a whole, is in existence. In this work Lundborg treats of several weighty race-biological questions, and he shows very plainly that myoclonus-epilepsy is inherited in fact as a recessive factor according to Mendel's law. This is the first time that anyone has succeeded in showing exactly, that the disposition for the disease appears as a recessive unit in mankind.

Professor Lundborg himself gives a very brief account of these investigations of his in this work (see page 57).

During recent years Lundborg has been busy with race-biological studies among Swedes, Finns, and Lapps in the most northern parts of Sweden and at the same time he observed attentively the biological effects of a mixture of race and of intermarriage. In several articles in Hygiea, Svenska Läkaresällskapets Handlingar (The Swedish Medical Society's Proceedings) and Hereditas he has recently taken up the treatment of questions of this kind and thinks it may be found that higher stature, increasing disposition for tuberculosis as well as certain signs of »degeneration», stand in some connection with the crossing of races.

By means of arranging National and Race-type Exhibitions in several parts of Sweden in 1919 and by popular works (among them Swedish National-types) Lundborg has helped strenuously in awakening the interest of a greater public in anthropological, race-biological and eugenic questions in Sweden.

STANDARD WORKS ON ANTHROPOLOGY AND RACE-BIOLOGY.

Anders Retzius: Om formen av Nordboarnes kranier (1842). — Gustaf Retzius: Finska kranier (1878); Crania Suecica antiqua (1900); Das Menschenhirn (1896). — G. Retzius and C. M. Fürst: Anthropologia Suecica (1902). — Gustaf v. Düben: Om Lappland och Lapparne. Etnografiska studier. Stockholm 1873; Crania Lapponica. Stockholm 1910. — C. M. Fürst and Fr. C. C. Hansen: Crania Groenlandica. Copenhagen 1915. — H. Lundborg: Medizinisch-biologische Familienforschungen innerhalb eines 2,232 köpfigen Bauerngeschlechtes in Schweden. Text u. Atlas. G. Fischer Jena 1913. H. Lundborg: Svenska Folktyper, Bildgalleri, ordnat efter rasbiologiska principer. Stockholm, A.-B. Hasse W. Tullberg 1919.

THE SWEDISH STATE-INSTITUTE FOR RACE-BIOLOGICAL INVESTIGATION

AN ACCOUNT OF ITS ORIGINATION

BY

Doctor HJALMAR ANDERSON

BERGVIK

ON THE 13th OF MAY 1921, THE SWEDISH PARLIAMENT RESolved (almost unanimously) to grant a sum for the establishment of a Race-biological Institute. And, as the foundation is thus laid for the first State Institution in the world of this kind, a short survey of the origination of the Institute is not out of place.

Eugenic ideas and efforts are no novelty in our time. Both in Swedish legislation, and that of other countries, are found, from ancient times, inconsiderable tendencies in the direction of eugenics. We find that sociologists and statesmen of different periods and nationality, have had race-hygienic ideas, at least sporadically, and we meet with them also in philosophical and medical works (e. g. in Plato's Politeia).

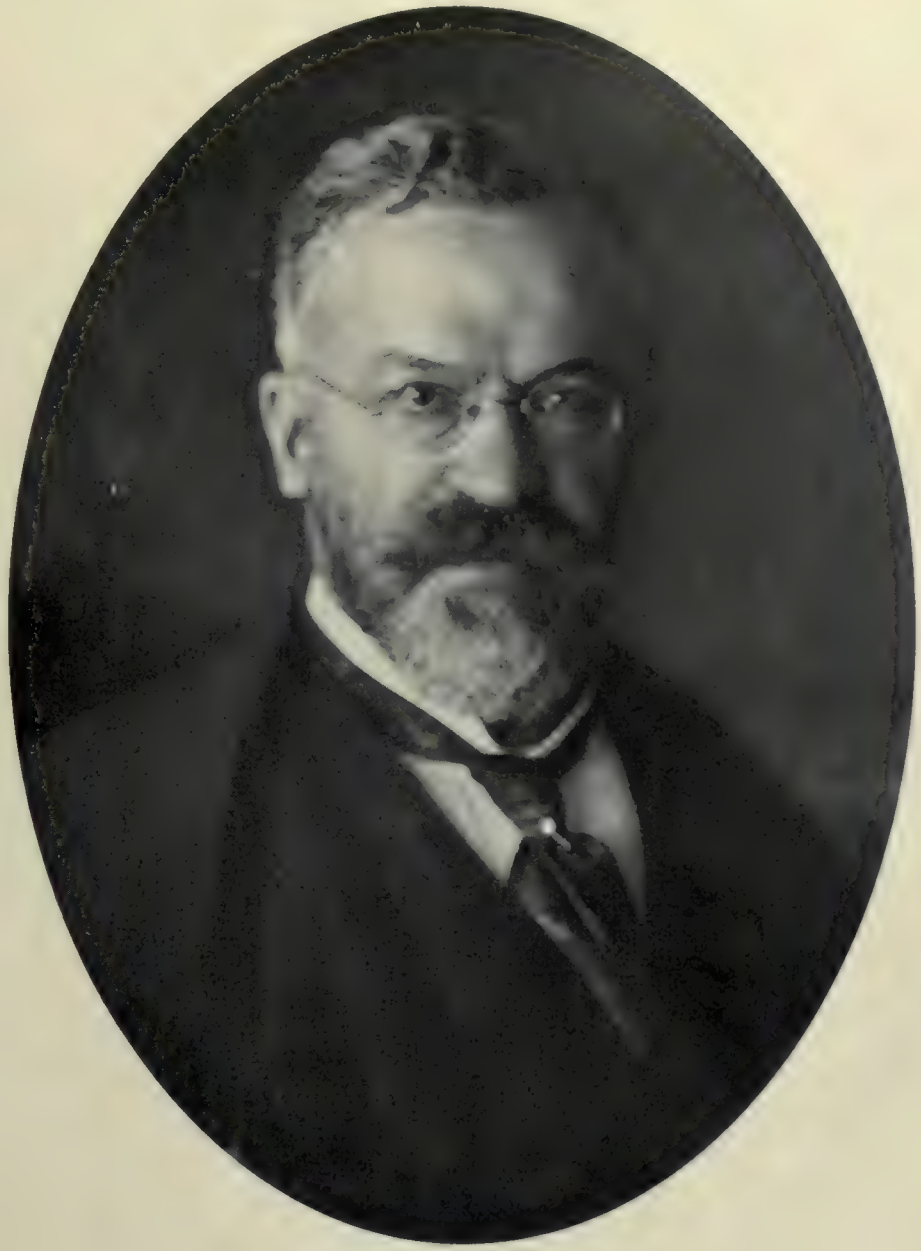
The rise of the doctrines of development during the latter half of the 19th century, naturally nurtured the idea to influence the biological development of our race. More than anything else, the revival of Mendel's Laws, about the end of the 19th century, increased the interest for race-biological and eugenic questions. It was first through this revival, that race-biology began to stand on firm ground.

During the last decennaries, the »Temperance Movement» in our own, as well as in other countries, has without doubt, also tended to spread eugenic ideas, through its strong emphasis of our responsibility towards coming generations. Finally, in recent times, the late great War, with all its horrors, and pitiable consequences, has caused many to put their hope in race-biology and eugenics, as the possible saviours of suffering Europe.

Doctor Herman Lundborg was the first, who, in our country, advanced these ideas, and their great significance, forcibly and energetically, and he, through his pioneering scientific labours, and energetic enlightenment, has succeeded in gaining respect for race-biology in this country. In 1904 he gave a lecture to the Uppsala Physicians' Society on this matter, and amongst his remarks were the following:

»A people who, in good time learn to appreciate the importance of heredity-hygiene, and fulfil its demands, can look into the future with equanimity. A race which continuously degenerates, cannot in the end survive the struggle for existence, however well-armed they appear to be in a military sense.

We should remember that powder and shot do not protect us from tuberculosis, alcoholism, nerve- and brain disorders, and other enemies of the community at large. It would be much better if civilized countries, instead of directing



DOCTOR CARL SWARTZ.

Chancellor of the Universities in Sweden, Statesman, Stockholm.

* 5/6 1858.

their armaments and weapons against each other, would expend their revenues, and mutual strength, to combat enemies of this description. I dare hope, that the time is not far distant, when one will be inclined, in public affairs, to allow the word of the biologically educated physician to have as much weight at least as that of the lawyer and soldier, and when sociologists and statesmen become awake to the significance of heredity-hygiene for the future of mankind.»

The Race-biological Institute of the University is accomodated in the building to the right.

Parliament has during later years granted Doctor Lundborg a sum of money for undertaking Race-biological investigations in this country, and Uppsala University has procured temporary premises for the above purpose, and placed them at his disposal. But these arrangements are found to be insufficient. Lundborg himself and other prominent investigators in this country, agree that a well-equipped Institute must be established. A wide-spread opinion in Sweden has supported this idea. We may below quote the remarks made by well-known investigators, biologists, and physicians.

»It is sincerely to be hoped» writes Professor H. Nilsson-Ehle of Lund, »that the idea of the Swedish Race-biological Institute, which, during the last few years, has been advanced and strongly supported by several authoritative persons and institutions, may be realized without delay. It is apparent to the theoretical heredity investigator, that the great and difficult task must lie in the hands of medical science. Here are found the necessary qualifications, which consist of a thor-

ough knowledge of the human organism, and which exclude dilettantism in investigation. And in the eventual practical application of race-hygiene, it is specially necessary that the whole should be seen from a physician's point-of-view. The thorough attention to the health of the race will better counteract prejudiced, or hasty ideas regarding the complicated science of race-hygiene; and thus a guarantee is secured that the whole matter would be handled in a humane manner.

The importance of race-hygiene cannot be over-rated, inasmuch as it will enhance the earthly happiness of the human race; moreover, one cannot avoid asking ourselves the question, as to what other science could, in this respect, really surpass it.

It is to be hoped therefore that the idea of the Swedish Race-biological Institute will soon be realized, and that its establishment, and equipment, will be such that, by the aid of sufficient Governmental subventions, and other means at the disposal of science, it can attain its end in a worthy manner, and will be beneficent, and an honour to our country.

Professor J. V. Hultkrantz of Uppsala states, amongst other things: »We cannot evade the elementary laws of life, and thus it is of great importance that our own written laws do not come into conflict with the same, but instead, be adaptive to them in the best possible way. — A nation's possibilities of future development, in the first place, depend upon its racial qualifications, and the great importance of an inventory of the biological resources of our people, is very apparent.

Even they, who possibly mistrust the idea that eugenics (race-hygiene) will succeed in finding any effective means to improve the race, must see how important it is for a people to »know themselves», and be fully aware, both of their power and limitations.

In our country race-biology possesses no scientific Institution, nor any permanent representative at the University.

It would be both a duty and an honour for our country, to partake in Race-biological research, as much as possible.

If the Swedes are, in the future, to maintain their position in competition with other nations, and take advantage of their natural resources, and if they are to avoid degeneration and downfall, and utilize remedies in the right way, the first condition is that they obey, in good time, the wise old admonition »know thyself». The first task for the Swedish Race-biological Institute is to energetically aid the fulfilment of this precept; to attain this end alone is sufficient to justify its establishment.»

The well-known experimental biologist Docent Nils Heribert-Nilsson of Lund writes: »We sacrifice without hesitation, enormous sums for the up-keep of disciplinary establishments and prisons, to maintain individuals which, by race-biological means could be considerably reduced. By making this statement I do not mean to censure these establishments in the slightest degree; and I wish to emphasize this, to avoid any misunderstanding; for as long as these unfortunate categories of beings exist, they must be attended to, and taken care of. But the pity of it is, that they must exist, so long as the Government undertakes nothing to thoroughly probe to the root of the evil, i. e. the inferior characteristical propen-

sities. And is it not unsound economy to willingly sacrifice large sums to support the evil, but not a penny to forestall the same, when we have the means at hand?

In Sweden this problem could be more easily solved than in most other countries for a certain reason: that is to say, we have the immense advantage of possessing a Swedish race-biologist, who as regards his researches, is admitted to be one of the foremost, namely Docent Herman Lundborg, whose pioneering researches I have referred to above. He has bestowed an incredible amount of painstaking labour in solving problems which are the most important in Race-biology, and has achieved great success. Would it not be a simple token of gratitude, and a deserving reward, for a sacrificial and disinterested life-work, to give him the opportunity, under more favourable conditions than obtains now, to continue the researches, which are of such great importance for the future welfare of our people?

Two Swedish women in prominent positions, namely Ellen Key the authoress, and Baroness Ebba Palmstierna have, on several occasions, with emphasis and enthusiasm, given expression to their faith in the feasibility of eugenic ideas, and have spoken in favour of the Swedish Race-biological Institute as a first step in the right direction.

This question came very much to the fore, when the Rector of the Karolinska Institutet (The High School of Medicine in Stockholm) Professor F. Lennmalm, one of the most prominent physicians in Sweden, in a long report to the Nobel Committee of the Institute in December 1918, advanced the idea of the establishment of a medical Nobel Institute for Race-biology. From his expert and thorough explication, the following may be quoted:

»There has, for a long time in this country, been a desire to establish a Race-biological Institute, and several biologists, physicians, and national economists have given expression to this in print. Now that there is a possibility of establishing a medical Nobel Institute, I, for my part do not know of any branch of medical research which, for its development requires so much support as race-biology, nor do I know of any branch of medical research which, on account of its significance, is more worthy of such support. The »Karolinska Institutet» would prove to be an excellent guardian of Alfred Nobel's testament, and the Institute would also be very benificial to Medical Science through the establishment of a medical Nobel Institute for Race-biology and Heredity research. The »Karolinska Institutet» would hereby also embody the new science: a High School of Medicine which would retain its position as the most prominent in the country, must endeavour to support the new branches of Medical Sciences which are working their way up, and can easily be stifled if not duly sustained.»

The Committee agreed unanimously to the suggestion, which for essentially formal reasons, was not accepted by the Board of the »Karolinska Institutet».

At a later conference of the »Karolinska Institutet», Professors Lennmalm and Gadelius, strongly emphasized the significance of the Race-biological Institute, in the following words:

»During the discussion regarding a Race-biological Institute it has been stated, that the whole question can be settled by appointing Docent Lundborg in Uppsala, to a professorship. In the meanwhile this would be a solution which is by no means compatible with the real weight and significance of the problem,

although naturally, Lundborg has, for a long time, been specially worthy of this distinction. Parliament has indeed demanded an explication of the need of a Race-biological Institute, and such an investigation would seem to be quite unnecessary, if the thing at the commencement, could have been so much simplified, as only to be a matter of appointing a worthy scientist to a professorship. But here it is quite another question.

Fully awake to the significance for our people of heredity researches, now, and in the future, it is the intention to guarantee the existence of the science, and not of any single scientist. And what makes a really permanent Institute of research necessary are the difficulties which are met with in the investigations to be made. It is not sufficient that single investigators attempt to ascertain historically, the conditions of health and disease of previous generations; it is necessary to form a continuity in this work, by organizing an Institute whose methods of research, and the results thereof, make it possible for one generation of physicians after the other, to continue, and complete the researches of the foregoing generation; the material to be investigated is the continuous series of human beings followed from generation to generation. It goes without saying that such a task cannot be ensured by conferring a professorship on *one* person, who cannot depend upon a successor following up his work. To suggest the establishment of a personal professorship is certainly an act of respect to the scientist in question, but is at the same time, a depreciation of the significance of the whole question.» —

Several of to-day's most prominent investigators abroad, who have had the opportunity of expressing their opinion, have unanimously stated that an institute is of great importance, and that a professorship is insufficient. The names of these scientists are as follows: Professors W. Johanssen of Copenhagen, E. Baur of Berlin, M. v. Gruber of München, the anthropologist the late R. Pöch of Vienna, W. Bateson of London, A. Thomson of Aberdeen, and C. B. Davenport of New York.

In January 1920 a motion for a petition to the King was submitted by the Swedish Parliament by very prominent members of all parties, amongst others, the former Prime Ministers Hj. Branting, and A. Lindman, the Vice Speaker in the Second Chamber Count Raoul Hamilton, Professors K. Kjellberg and N. Wohlin, the Councillor of Education Doctor W. Björck, and the Head-inspector of the Hospitals for Mental Diseases Doctor A. Petrén, containing a request regarding an explication and suggestions in reference to the founding of a Swedish Race-biological Institute. The motion was unanimously carried in both Chambers. Below are extracts from the same:

»Race-biological investigation, which works to attain a high and noble object: protection against genealogical degeneration, and the furtherance of good racial attributes, grows daily stronger and stronger. The motion is based upon the standpoint that there is nothing so precious in a country as the racial material itself, especially if this, as is the case with the Swedes from ancient times, is of good quality. The task this scientific investigation has to contend with, is to explicate and elucidate all conditions regarding heredity and environment which cause an elevation, or debasement of the inherent worth of a race. Then, firm bases and guidance can be given to a State in its endeavouring to enhance the development

of the race and people in the right way. Race-biology is, in other words, the scientific study of all the factors which exercise influence on the physical and spiritual structure of coming generations. Thus has the Englishman, Francis Galton, simply and clearly defined this branch of science, of which he himself is really the founder.»

And further: »Already several years ago, a prominent English investigator, Professor THOMSON, stated when speaking of the significance of race-biology, for the human race: »We cannot but feel that the application of biological results is *only beginning*, and beginning with a tardiness which is a reproach to human foresight. There can be no doubt, that it would pay the British nation to put aside a million a year for research on eugenics, or the inprovement of the human breed.»

The truth of these words is clearly apparent, when one takes into consideration the enormous and incessant increase of expenditure in reference to defective, abnormal, criminal and anti-social individuals of different kinds, in all civilized countries.

Seen from this point-of-view, we must look upon the establishment of a Race-biological Institute as an absolute necessity, a pure and simple act of self-defence on the part of a country, against its internal enemies.

It is a duty of Government to pay attention to these demands, which have originated from the most prominent investigators and physicians. They have a powerful public opinion behind them which cannot be silenced in the end. On the contrary, they meet with immediate approval in daily increasing circles. The instinct of self-preservation in a race, tells them that something must soon be done, to counteract the present degeneration which threatens to get the upper-hand.»

By reason of a Parlamentary resolution, the Government requested investigations, and direct suggestions to be made by the competent authorities as follow: Uppsala and Lund Universities, »Karolinska Institutet» in Stockholm, the Royal Medical Board and the University Chancellor. All these authorities testified to the great significance of Race-biology, and supported the establishment of a Swedish institute for Race-biological investigation (including human heredity research). The Government gave its support, and brought forward a proposition on the subject to Parliament in 1921. We can quote some remarks of the Minister of Education, Dr. B. Bergqvist, which received the Royal sanction, and approval of the Ministry:

»It is without doubt clear to all, who are awake to certain circumstances at the present time, that we cannot avoid being anxious for the future of the civilized race. Amongst the many beneficial influences which are at work to improve and meliorate the conditions of the human race, there obtain regrettable and dangerous factors through which the result of these influences is threatened by undermining and annihilation. The struggle between these conflicting currents is not new, but we at the present time have possibly felt the danger more forcibly of permitting the destructive forces to execute their work, without any attempt to counteract them. The meaning of the expression »Culture's sacrificial nature» stands out clearer, the more civilization advances. As the welfare of the people as a whole improves, mortality decreases, and the average length of life is increased etc., a

simultaneous race-deterioration threatens. The vigour of the race is destroyed, and thus too dear a price has been paid for the advantages produced by a highly-developed material, and spiritual civilization.

However, for a long time back, endeavours have been made to take measures against the above-named destroying forces. But up to the present these endeavours have principally been directed to the easily accessible task lying nearest to hand, that is, to improve the exterior conditions of mankind, (the social environments), or one has turned attention to the symptoms which are apparent through the short-comings of these conditions of life, that is to say, of the social conditions. With all appreciation of what has been, and continues to be done, we are however awake to the fact that through this alone no genuine result is to be won against the evil we have to combat. One cannot rely any longer on improved environments only. It is the powerfully prominent insight of *inheritance* and its signification for the existence of the race, and its improvement, which is of importance here. Plant-life was the first sphere in which the so-called Mendelian Laws held good. In this work, Swedish investigation has taken a prominent part. By this I naturally refer, in the first place, to the pioneering investigations which have been achieved by Professor H. Nilsson-Ehle of Lund University. In this connection I should like to bring to recollection, that by special resolutions of Parliament in 1917, arrangements were made to put Nilsson-Ehle in a position to devote his time wholly to that branch of Botany, heredity doctrines, and especially improvement of plant-life, in which he undertook his epoch-making theoretical and practical investigations. By Royal decree, Parliament resolved to confer a professorship on Nilsson-Ehle at Lund University, in the science of heredity, and through a grant of land at Alnarp's Agricultural Institute, with arrangements of premises, and appointment of assistants, to establish a Heredity Biological Institute for scientific investigation, and practical experiments in the refinement of plant-life. Meanwhile it is now generally admitted that the Mendelian Laws hold good not only for plant-life, but also in the animal world, and for human beings. To ascertain how far these laws could be applied to human beings, is one of the important tasks, the comparatively new science which is called race-biology, has to deal with. It will endeavour to solve the problem of heredity, ascertain its significance to health and disease, indicate the way to preserve the good racial attributes, and hinder the progress of the bad ones. It endeavours to solve »one of the greatest social problems of the present day» (Professor F. Lennmalm).

It is not an easily attained or accessible object which race-biology desires to reach. This is apparent, because where it is a question of human beings, race-biological experiments which correspond to those, which could be undertaken with plants and animals, are impossible. Other means must be found to attain the desired result. Many years must pass, of patient, laborious research, comprising thorough investigation in different spheres. The explication of human hereditary conditions, and the inheritance of diseases, and other attributes, demand, as stated in the motion, a great quantity of material, comprising not only single individuals, but also whole households and families, a collection of material, not only as regards that living at the present time, but through examination of archives, reverting to by-gone times, and through observation continued during the future. — — —

Thus if one is convinced of the reality of the dangers threatening the welfare of the race, as before mentioned, and admit that in race-biology there is a possibility of obtaining a means of counteracting these dangers, it is apparent that one should without delay, support race-biological science, although it will be in a distant future before it can fulfil, to any great extent, its practical and self-imposed task. The forces which threaten to envenom the race, will be at work incessantly, and their activity will be ever on the increase. The sooner the antidotes are prepared, the more beneficial they will be.

In consideration of all that I have said, and the opinions given on the subject, from which I have taken a part of my remarks, I do not hesitate to agree with the unanimous sentiments contained in these opinions, that one should give the race-biological science powerful support for its continued development. The help the community have hitherto given its future assistant in self-defence is insufficient. It is not enough that, occasionally, more or less Government support is given to single scientists; it demands a firmly organized scheme of investigation, with co-operation of well-qualified assistants. The magnitude and intricacy of the task before us, demands this. — — —

As the personal professorship, the establishment of which is now under consideration, would be conferred on Docent Lundborg, it would be of great interest to hear his own opinion on the subject. — — — His decided refusal of this professorship, gives us no option in the matter.

Thus remains the question of establishing a Swedish Race-biological Institute. The objections raised are not in my opinion decisive. — — — This is for us, as it were, a remarkable step to take, but the importance of the matter demands that it must be handled in an unusual way. The fact that the goal of race-biology appears to be in the distant future, should as we have already stated, not relieve us from the duty of acting immediately, and equip the same with means for its development.

In the proposition it was suggested that besides the salary for the future principal, Docent Lundborg, an extra sum of 82,500 Crowns (Swedish) should be granted for 1922, of which 24,000 Crowns should be utilized for the first equipment of the Institute, 26,500 Crowns for working expenses, and the balance for salaries of assistants.

The financial position of the State however, at this time of general economical depression, is specially serious, and Parliament this year was obliged to be very careful with regard to expenditure, in every way.

On the Parliamentary Committee of Ways and Means. which had the preparation of this question on hand, voices were raised in favour of the alternative, that is to say, to be satisfied for the time being with a personal professorship for Docent Lundborg, also an University Institute of smaller dimensions. As Docent Lundborg energetically refused to co-operate in such a solution of this important question the Committee agreed to the proposition, but were in favour of a reduction of the grant for 1922, to 60,000 Crowns and a salary for the principal. In the report of the Committee it stated:

»The Committee are in full agreement with the Head of the Department respecting the importance of researches, which the Race-biological Institute intends

to make. In consideration of this, and with regard to the opinion which Parliament expressed last year, when it empowered the explication on this matter, the Committee thinks that it should assent to the Royal proposition on principle. A further reason for this is, according to the opinion of the Committee, the fact that a principal for the Institute can now be appointed; a deserving investigator who has, for a considerable time laboured in this science, and whose activity, in the opinion of the Committee should be continued to aid the completion of the work which he has so successfully commenced. If the Committee thus consider that they should on principle, support the Royal proposition, the Committee cannot, entirely, on account of the financial condition of the State now ruling, support the same. Nevertheless they are of opinion that an Institute of this description should by degrees be organized and developed to such an extent, that the results attained, warrant such organization and development.»

On the 13th of May both Chambers in Parliament assented without a division, to the proposition of the Committee, the First Chamber, without debate, and the Second Chamber, after a short one. The Minister of Agriculture, N. Hansson M. P., made a brilliant speach in the Second Chamber, in favour of the Institute, and this was loudly applauded.

The Swedish Government owing to this resolution, have led the way, and given an example worthy of being followed by other countries in nourishing this important young science, which is called Race-biology. That this could be accomplished in the midst of a period of a very serious financial crisis, is really due to one man, Professor Herman Lundborg. He has, for twenty years, with small financial resources, a burning desire for investigation, unconquerable energy, rare and admirable disinterestedness, devoted the whole of his strength to the achievment which has now gained a Governmental acknowledgement; and the future development of which is thus in safe hands. The resolution is, to a large extent, the fruit of Professor Lundborg's scientific contributions, and the revival of eugenics, which he, more than anyone else, has helped to give our people. For a moment it looked as if the financial troubles in Parliament would have stifled the suggestion of an Institute. Professor Lundborg did not however hesitate a moment, in deciding to allow the whole question to fall through for the present, rather than receive the personal honour and security, which a professorship would have procured him, when he saw that science would be too badly served by such a solution of the problem. He would not have been the idealistic and unselfish man he is, if he had acted otherwise. He has earned the thanks of the Swedish people.

THE HISTORY OF A SWEDISH FARMER'S LINEAGE AS SEEN FROM A RACE-BIOLOGICAL STAND-POINT*

OF

HERMAN LUNDBORG

A COMMONWEALTH CONSISTS, AS IS KNOWN, NOT ONLY OF individuals, but also of households and families. These combined constitute a people. A constant family-tie engenders the safest foundation for a »culture» State. It is in the interest of every well-organized community to preserve, and further strengthen such a social principle, which has shown itself to be beneficial from times immemorial.

For this purpose, we must acquire a thorough knowledge of a large number of kinsmen, during several generations. We must confess that very much is needed, before we have reached this goal. Thither we shall arrive sooner or later however.

We must never forget, that the greatest opulence a country possesses, is its own people, provided they are of a good stock. We Swedes are, in this respect, fortunately situated. We should not therefore shun any sacrifice, to cherish, and augment the biological inheritance, which a generous nature has bestowed on us. It is inadvisable to feel too secure in the belief that this vigorous source is inexhaustible. It can decrease, or even wholly disappear, if we do not understand how to economize sufficiently.

Ancient sages have given utterance to the wise saying »Know thyself». It applies to us even in these days. But we must add more and say, »Learn to know thyself, your kindred and your people».

When it is a question of putting this precept into practice, we must not be satisfied with only a superficial knowledge, but we should penetrate further into the matter, as other scientific explorers do such as historians, biologists, physicians etc.

We must learn to know thoroughly the various stocks, their life and conditions, and the forces which generate development, in one or the other direction. We should therefore carefully pay attention to biological, physiological and pathological conditions existing in the same, that is to say, to obtain knowledge regarding the constitution of the family, its disposition, its social value and ability etc.

One often hears it said that nothing is to be gained by investigating the conditions of »a farmer's family, which is similar to all others». This is a great mistake. The social position of a family, is by no means the most important

* This representation is grounded upon the author's work: — Medizinisch-biologiche Familienforschungen innerhalb eines 2232-köpfigen Bauerngeschlechtes in Schweden (Medical-biological Family-researches containing 2232 copies of peasant-families in Sweden). Text und Atlas. G. Fischer, Jena 1913.

point. One can compare the Swedish race with a lofty and vigorous fir. The farmers may be discribed as the »heart» of the tree itself.

By reason of this fact, we should give this type of family our special attention. Moreover, we have here a very accessible field of labour.

A scientific investigator would, without doubt, naturally be interested in any human family whatever, of high or low social standard. Farmers, peasants and labourers, should interest us, quite as much as noblemen or princes.

It is not rank, titles or, brilliant careers which are the subject of our studies in race-hygiene, but it is a question, of larger or smaller groups of human beings connected by blood, or race. It may easily happen, that a single poor, and degenerated family can teach us more than a dozen others of average type.

The goal, which we are striving to reach is to acquire a thorough knowledge of the laws of inheritance as appertaining to mankind. In the struggle, which is before us, we must undertake assaults from as many different positions as possible.

THE SWEDISH LISTER FAMILY.

The reason why just this family of farmers, who have lived a very long time in Listerland in the south west of Blekinge, is the subject of such thorough investigations, is that a very uncommon family disease obtains amongst its members. This disease is known in medicinal literature, as myoklonus epilepsy. It appears occasionally in other parts of the world, but nowhere is it so prevalent as in the Blekinge family in question.

It has not been observed in other parts of Sweden. In Norway it is unknown.

When I, at the end of 1890 arrived in Listerland, my first task was to investigate the nature of the disease. The doctors in the district had no clear idea regarding the same. I had, therefore to begin from the beginning, and had to note all cases of illness, from which, I worked out a genealogical table. A talented school-teacher, who was a member of the family in question, and his nearest relatives, were very helpful to me. I am very grateful for the admirable assistance they gave me during my investigations.

With the help of the parochial register I succeeded, after much labour, to obtain such complete genealogical tables that I could trace the origin of the various branches. It appeared that all lines, as it were, met at one point, that is to say, all persons who were attacked by myoklonus epilepsy, 17 altogether, belonging to 10 different households, were offsprings of the same ancestors, who lived in the 18th century. In other families in the same district not a single case of this peculiar disease was met with. Hereby I had shewn it to be highly probable that the disease was hereditary, and not originating from any local conditions, in other words not, of endemic type.

My next task was to investigate which was the course taken by the inherited disease. By careful analysis (see original work) it is demonstrated that the disease is inherited as a recessive and monohybrid (simplex) factor in accordance with Mendel's law. I shall revert to this question further on.

I now began to eagerly study the disease itself, its nature and development.

Descriptions of this disease are very seldom met with in foreign publications. Boys as well as girls are attacked by it. Its usual progression is about like this. At an age of 7 to 10 years, the child is subject to nightly attacks, which are repeated with shorter intervals for some years.

During the day very little happens at first. Gradually however, a change appears. Skaking fits occur and, occasionally muscular spasms take place here and there, in different parts of the body. These symptoms gradually increase in violence, and spread.

A marked symptomatical periodicity is soon observed. The patients have comparatively quiet days, followed by days when the muscles become more and more agitated. Then one or more epileptic fits occur, after which the patient becomes comparatively quiet again. In this way it continues through life with increasing violence. Many patients die early, others having the advantage of good attention may live 20 or 30 years. They are a burden to themselves, and their environment, for in a few years after the appearance of the disease, they are helpless, and must be waited upon, and looked after as if small children. They are very troublesome as patients, for they are not only helpless, but as a rule stubborn and passionate.

The muscular spasms, and attacks of cramp keep the patient bed-ridden. During the most troublesome days, the muscular reflexibility is so increased that figuratively speaking a puff of air will be enough to produce spasms.

The patients cannot, under such conditions, take food. It is difficult, or even quite impossible to feed them, because, as soon as the food is placed in the mouth, (whether in solid or liquid form) irregular muscular spasms in the mouth and throat commence. All is ejected again. It is a sorrowful sight.

No radical remedy has been discovered for this serious disease. All our efforts are nearly fruitless in combating veritable inherited diseases. Both physicians, and quack-doctors have been resorted to, and large sums of money have been sacrificed — without result.

This fact should certainly open the eyes of both doctors, and the general public to the importance of taking preventative race-hygienic steps. A new epoch is approaching, when these ideas will be established. It will come as a blessing to both families and peoples.

I soon observed, during my investigations in the district, that this family in question was a rich field of labour for a more penetrating study. It was now considerably degenerated being numerous however and now living within a small limited district. One could here collect race-biological material of great scientific value, thus being well able to throw a light upon social and race-biological questions which are yet in darkness. Such a task however would require a scientific explorers time, and energy for a number of years.

* * *

The original forefather of the large family under investigation was a farmer in a prominent position, a member of the District Council, member of Parliament. Per (1721—1804). He was dark, healthy and robust, talented quick-tempered, imperious, often involved in disputes, and law-suits, even with his own children.

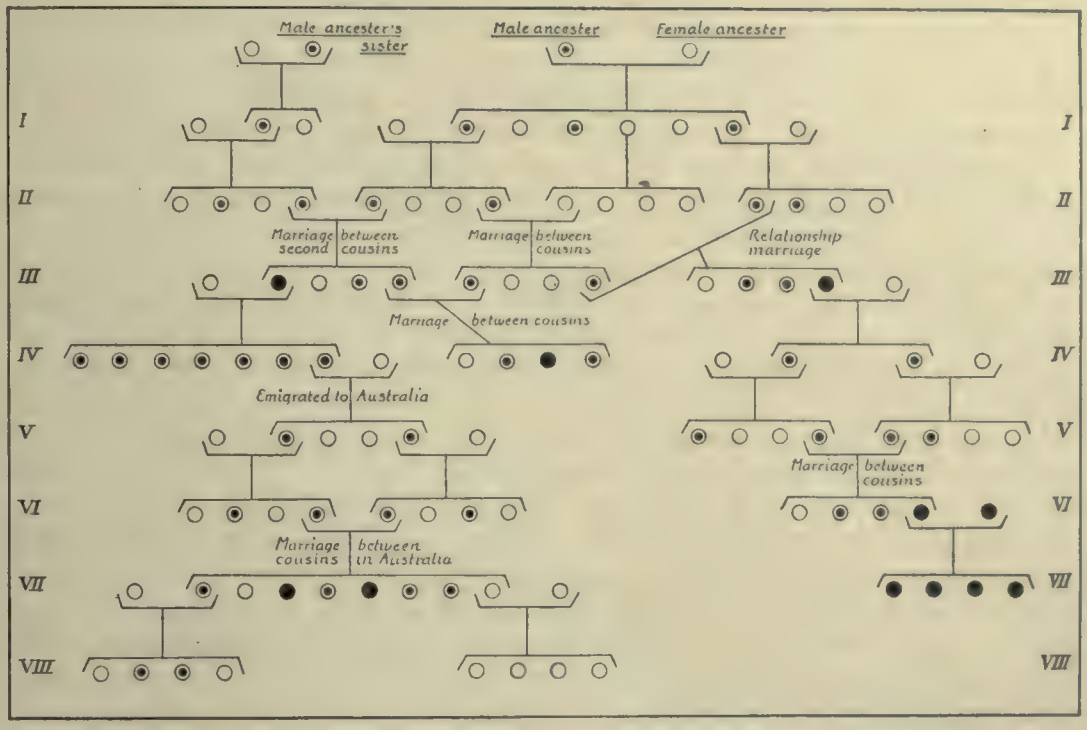
His wife, was named Kersta (1723—1799). Of her we know but little; however she appears to have been of a mild and retiring disposition, and grieved at the disputes between the children. Their children were, 1. Kersta, who married a farmer, was dark, robust, narrow-minded, conceited, despised by her brothers and sisters. 2. Knut, farmer, member of the District Council, member of Parliament unusually talented, under average height, but was remarkably strong and hardy, was interested in his work, acquired learning, and worked himself up to a prominent position in his native place; where he was known as »King of M—by». He was imperious, passionate and hasty. When a member of Parliament, he was one of the Secret Committee, but was not tolerated on account of this temper, hated by his brothers and sisters, and he removed from his native place. He was without doubt a very unusual personality. 3. Bengt, fair, of average height, powerfully built, not particularly intelligent, of a quarrelsome nature, revengeful and fond of law-suits. He was also a clever farmer, drank heavily and was fined several times for fighting. Great hatred existed between him and his brothers, expecially as regards Knut. 4. Elsa, dark, small, powerfully built, intelligent, proud, revengeful, unrelentless and despotic. She was the principal in the bitter family quarrels with the prosperous brother Knut. 5. Pernilla, married a farmer, not particularly intelligent, otherwise not much is known of her. 6. Pehr, a large farmer, member of District Council, member of Parliament, very dark, short, not particularly intelligent, economical, rich, conceited, egotistical, and fretful. He was fined for libel, was elected member of Parliament instead of Knut, for which position he was not suitable.

We now pass on to the heredity table, this comprises 8 generations excluding ancestral parents.

We find that in generation III, IV, V and VII diseased individuals appear (all-black symbols). Usually both the parents of the invalids are apparantly sound, but both have a propensity for myoklonus epilepsy. And as the disease is only found in one district in Sweden, the parents therefore must be related. The parents, on their part must have acquired the propensity from one (or both) of their parents etc., etc. Thus we can conclude that at least one of the ancestral parents must — though apparently sound — have had the propensity in question. It is not impossible that both the ancestral parents had this propensity. The question arises: is it possible to determine this? Yes, undoubtedly. The investigation of this family shows that the ancestral parents had 6 children — as above mentioned — who all became grown up and married. They thus constitute the source of 6 different branches of the family. If both ancestral parents had been »heterozygots», with a propensity for myoklonus epilepsy, one at least of these children would have been affected, (that is to say, a recessive homozygot), but this was not the case. Whereby, and owing to other circumstances, (see below) we can conclude, that without doubt, but one of the ancestral parents had a transmissible propensity. If this had been the case, the question arises, which of the ancestral parents had this propensity, theoretically either the husband or the wife could have had it. Sex plays no part in the hereditary transmission of this disease.

In the meanwhile, the disease has appeared in the male ancestor's family, but not in the females, and from this fact we can deduct that the male ancestor must have had the propensity and not the female. A sister of the male ancestor must have had the same propensity, because, when a grandchild of hers, married a grandchild of the male ancestor, two of their several children had this serious

INHERITANCE SCHEME RELATING TO THE FAMILY DISEASE MYOKLONUS EPILEPSY IN BLEKINGE.



Explanation of symbols (● ◉ ○).

● *denotes a person affected with myoklonus epilepsy (=recessive homozygot).*
◉ " " " *healthy but with propensity (=heterozygot)*
○ " " *healthy person without propensity (=dominant homozygot).*

disease. Both these parents must therefore have been heterozygots, and the propensity must have originated from the male ancestor and his sister, through one of their parents, but not from the female ancestor, or her family.

The first bearer of the propensity for myoklonus epilepsy of which we have any information thus lived in the 17th century. There we lose all trace. It is impossible to determine whether the propensity has originated in Sweden, or was brought here from some other country.

Professor UNVERRICHT in Dorpat was the first to describe the disease in question.

He has observed several cases in one and the same household in Esthonia. It is not only possible, but very probable that these families living in Sweden and Esthonia, had the same root many years ago, for diseases of this type go in

invisible links from generation to generation, from family to family and from country to country. Below, we shall give examples of this.

The table shows that there must be a propensity for a certain recessive disease to appear in one or several of the children. If one of the parents is effected by the disease, and the other is a healthy homozygot, all the children will be sound, though heterozygots. If the propensity of the disease is a dominant attribute, so in the last mentioned case, all the children will be affected. On the other hand, if both the parents are sound, although heterozygots with propensity for a certain recessive disease, 25 % of the children will be affected This is a very common occurrence with human beings, that is to say, an epileptic or a person of weak mind, may have healthy parents or even forefathers for several or many generations, for heterozygotism can be inherited from generation to generation, without the disease appearing.

In such families in which the propensity of the disease of a recessive nature is inherited, one often finds one or of few cases of the disease here and there in different households, whereas other families or branches are free from the same. The disease appears within households with collateral expansion, though seldom in 2 or more successive generations. Numerous marriages between relations increase the number of such cases apparently, as persons with similar hereditary propensities are thus often united.

Moreover it is of great importance to remember, that not a few people, who appear to be quite sound, are often bearers, and transmitters of serious propensities, they are, so called »conductors».

From the present scientific standpoint, we cannot unfortunately beforehand distinguish between homozygotically and heterozygotically sound persons, which however would be of great importance, because heterozygots often, in future generations, generate persons affected by the disease.

* * *

In our investigations, we have progressed so far, that we know that the male ancestor of the Lister family was without doubt a heterozygot, the female ancestor was most probably a healthy homozygot. As I have just shown, Mendel's law demands that 50 % of the children should be heterozygots with a propensity for the disease and 50 % healthy without any propensity. Let us now see if this agrees with the true position within this family. The number of the ancestral parents' children was 6, of which three in all probability would be heterozygots, and three healthy homozygots.

How can we know if this is the case or not, as all are apparantly sound? »By the fruit we know the tree.» On investigation, we find that 3 of the branches of the family had unhealthy offspring, when married with relations, but not the other three. The matter thus stands as we had expected.

From the heredity table we find further, that 2 unhealthy individuals (females of the Blekinge family) were married, and had offspring, none of whom were diseased. Even this circumstance is quite in agreement with Mendel's law. For, if one of the parents is a healthy homozygot, (without any propensity) and the

other an unhealthy homozygot, we can expert that all the children will be healthy; but it should be noted: all have the propensity that is to say; all are heterozygots. Three of these children having attained mature age, emigrated to Australia, and married (not to relations). Half the number of the children of these marriages will be heterozygots. When these marry in Australia, 50 % of their children will be heterozygots, and so on. Let us imagine that 2 brothers or sisters, who are both heterozygots in time to come — e. g. in a hundred years or more — remove with their families to a distant part of the country. Their children perhaps grow up without having any neighbours; and then it is highly probable that cousins marry, that is to say, new sources of the disease, appear there occasioned by such marriages, which result in a fresh appearance in the offspring, of myoklonus epilepsy (see generation VII in the table).

Parents, who see such a disease break out in one of the children, are very horrified. They have most likely forgotten long ago, that they originated from Sweden. And they probably know nothing of the family disease in Blekinge. They resort to a doctor for help and advice. The doctor asks them the reason of this disease in the child. The parents would give then, as now, the first »local» reasons, which came to hand.

We will give as an example, what a doctor in these days, would hear from the parents: A child has perhaps been out playing, on a very warm day, and drunk cold water. The first attack occurs the same night. The parents think that the heat, and the drinking of cold water, are the cause of the illness, and tell the doctor this. Or they suggest that the child has eaten poisonous berries etc., etc. The doctor, who perhaps has an inkling of the true cause, probably enquires. »Do you think that it may be a hereditary disease.» He gets a decidedly negative reply as follows. »We know nobody in our family who has ever had the disease.» Here the matter is supposed to be settled. If it is a really clever and »schooled» physician, he is in a position to inform them, that medical science has discovered long ago, that the disease is decidedly hereditary, although it has only appeared in solitary cases, that is to say, in a certain percentage amongst children, if both the parents have a propensity for the disease, otherwise only the propensity is inherited. Now if the parents are in a low state of culture, the doctor cannot convince them of this, at least not as a rule, in these days.

They retain their idea of the importance of local causes, and think the doctor does not know his business. They resort to a quack-doctor, who has, as they think, a better knowledge of the disease in question. This is the usual idea amongst ignorant and unintelligent people.

* * *

The Lister family was at its best, during the latter half of the 18th century. They were far above other families in the district in question.

The members were called »the great», several of them were elected to Parliament as already stated, and one of them played an important part in the »Farmers Party» during the end of the 18th century. They deteriorated, however, in the beginning of the 19th century, when they distilled their own alcohol, and thus

became drunkards. Then degeneration appeared, and increased in an alarming degree, on account of the numerous marriages which occurred between relations. Now, a hundred years afterwards, the family is, as a whole, in such a miserable state that, in many cases, there are signs of a veritable collapse. Alcoholism and consanguinity still appear, but nothing like so often as before. There is still great fecundity in the families. As a matter of fact, it is often the case that the parents have 8 to 10 children. Fathers and mothers are not at all pleased at this, but wish to have smaller families.

Preventative methods have not been resorted to, to any great extent, but they have adopted the alternative of extending the suckling period as much as possible, usually 2 years, in the belief that a fresh conception cannot then take place. Experience shows, however that such an extended suckling period does not prevent a new conception.

Several of these women must therefore nourish, not only a child more than one year old, but also an embryo. When 8 or 10 such periods have occurred in a woman's lifetime, we can easily imagine what a miserable condition she is in, though still under 40 years of age. To fortify themselves, they resort to stimulating mediums, such as alcohol, but, chiefly coffee in large quantities. The extended suckling periods, the frequent confinements, the great consumption of coffee, have without doubt increased the miserable condition of these women.

Yet it is to be noted, that several of the mothers, on account of degeneration, have lost the capability of suckling the child, which is also a significant fact.

I also wish to mention that in my opinion, deterioration of the family has been caused by the emigration to America and Australia, which has taken place to a rather large extent, from that part of the country, during the last decennaries.

In all probability it was the most robust persons who emigrated. The less healthy who remained behind, generally married relatives as unhealthy as themselves, and thus one cannot be surprised at the result. In addition to emigration, they removed, of course, to other parishes. It is possible, that they, who have been fortunate enough to escape the general collapse of the stock, may be the progenitors of new families, who under favourable conditions would be regenerated.

One and the same family can thus be good material for the study of both degeneration and regeneration.

On the other hand, there are naturally whole families who are on the upward grade. A thorough study of such families may be as interesting, or even more so, than an investigation of those which degenerate. As above mentioned the male ancester lived from 1721 to 1804. In his time the family was rich and respected. They have now lost the greater part of their former opulence.

There are now distinct signs here and there, that the family is partially degenerated.

Marriages between relations occurred more frequently formerly, than now.

In the family in question, one meets, to a rather great extent, dark types, with a foreign appearance. Many years ago a blending of race occurred between dark foreigners and fair Scandinavians. The dark types belong to certain family branches are known as »the blacks». My anthropological investigations show

HIGHER OFFICIALS, WHO HAVE WORKED FOR RACE-BIOLOGY

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DOCTOR FRITZ BAUER.
Surgeon General, Stockholm.
* 17/8 1864

PROFESSOR NILS HANSSON.
Minister for Agriculture, Stockholm.
* 8/3 1867.

DOCTOR BENGT J:N BERGQVIST.
Minister for Education, Stockholm.
* 5/10 1860.

that we have in this district a large quantity of Brachycephali (25.6 % amongst school-children in the district). Persons with brown eyes appear here, more than in most other parts of Sweden. Several circumstances show that this race blend has been decidedly disadvantageous.

In the family there is considerable drunkenness, neurosis, idiocy, weak intelligence and criminality etc. (see below). Syphilis appears only seldom, tuberculosis is comparatively rare. In spite of the unmistakable degeneration which appears in the family, mortality is not specially high, in any case not greater than the average rate for the whole kingdom, according to my calculation. Thus we have here an example, which shows that a veritable badly constituted stock, in spite of unmistakable nervous-psychical degeneration can increase, and spread at home as well as abroad, in a very remarkable manner, a circumstance worth noting from a race-hygienic point-of-view.

We must not take it for granted, that such degeneration in itself, will diminish the family.

TABLE 1.

SPECIFICATION OF MATERIAL.

Number of descendants	1,909
Other persons married into the Lister family	241
Further additions (persons returned, belonging to branches of the family who had previously removed from the district)	34
Illegitimate children	48
Total	2,232

My material comprises, as table 1 shows, 2,232 persons, partly offspring of the ancestral parents, and partly 241 other persons who married into the family. The nearest relations of the latter-named persons I have not included in the present investigations (though they are mentioned and described in my original work) so as not to have the material heterogeneous.

TABLE 2.

NUMBER OF HOUSEHOLDS IN THE LISTER FAMILY AND FREQUENCY OF MARRIAGES WITH RELATIONS.

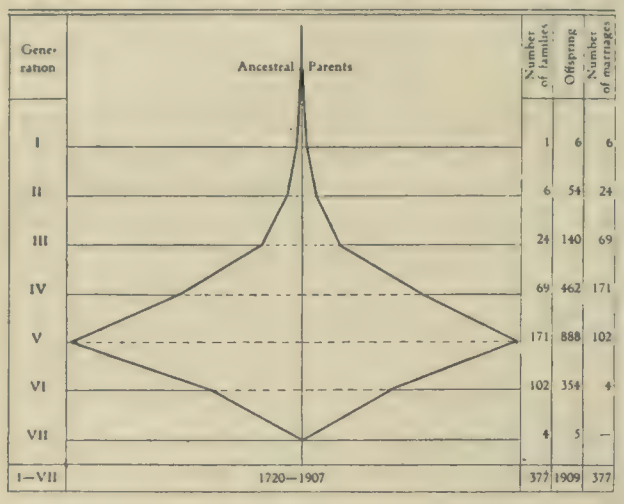
	Number		Percentage	
Households in which parents have been closely related (cousins—second cousins)	78	132	20.69	35.01
Households in which parents were distant relations	54		14.32	
Households in which parents were not related	245		64.99	
Total	377		100.00	

Table 2 shows, that marriages with relations have occurred often amongst the 377 households, which the material comprises. Marriages with cousins and second cousins have occurred at the rate of 20 %, with more distant relations more than 14 %, thus marriages with near or distant relations show a rate of 35 %, a specially note-worthy fact, to which I shall revert.

The diagram shows the increase of the family in each generation within the investigated district. In generation V are already found 888 individuals, which is evidence of an unusual vitality. Generations VI and VII are, as we find, much fewer in number, amongst other things because they are not yet complete. Future investigations of the family, if such ever take place, will show if any of these generations become so numerous as the fifth was. It is possible, that this will not be the case, because the family is now poorer than formerly, and much deteriorated, circumstances which in no small degree tend to disperse the same, that is to say, cause removal, and emigration. Farmers who must leave their old homesteads, have generally no desire to remain in their native district.

DIAGRAM

INCREASE OF THE FAMILY IN EACH GENERATION.



In addition to this, nativity in many places in this district has decreased.

In all probability other more robust families settle down, and perhaps are in their turn supplanted later on. We know very little of this social-biologic process: development of families, their life, struggles, and ultimate decline. It is like an unknown country, which must be explored.

* * *

We now pass on to investigate more closely the pathological conditions of the family, by aid of tables 3 and 4 which give an essential idea thereof. We find (table 3) that amongst 1,909 progeny, not less than 394 (= 20.6 %) were defective, in some way, 150 (= 7.9 %) of these were very defective. Amongst

TABLE 3.

THE DIVISION OF THE MATERIAL INTO DIFFERENT GENERATIONS.

Generation	Number of households	Number of children	Average number of children in each family	Died before the fifth year		Healthy over 15 years		Defects		Defective persons		Very defective persons	
				Number	%	Number	Percentage of survivors over 5 years old	Number	%	Number	%	Number	%
I	1	6	—	—	—	4	—	2	—	2	—	—	—
II	6	54	9.0	16	29.6	21	55.3	13	24.1	11	20.4	—	—
III	24	140	5.8	36	25.7	58	55.8	51	36.4	40	28.6	14	10.0
IV	69	462	6.7	122	26.4	181	53.2	158	34.2	133	28.8	50	10.8
V	171	888	5.2	195	22.0	279	40.3	228	25.7	177	19.9	71	8.0
VI	102	354	3.5	59	16.7	60	20.3	52	14.7	31	8.8	15	4.2
VII	4	5	1.3	—	—	—	—	—	—	—	—	—	—
I—VII	377	1,909	5.1	428	22.4	603	40.7	504	26.5	394	20.6	150	7.9

the »very defective» I comprise persons afflicted with idiocy, imbecility, mental diseases, marked *psychopathy*, epilepsy, and myoklonus epilepsy, which is a characteristic of this family.

Table 4 contains in column E the whole material, and we find there, that only 92 known cases of tubercolosis appears in the family, which is a small number, even if this is stated as a minimum. It is surprising that such is the case, in a family which in other ways is so defective. The reason of this is probably, that the family in question is immune, to a great extent, to this disease, usually so prevalent amongst the people.

Several other farmer's families in the same district, are not in this way so fortunately situated, for amongst them, mortality from consumption is much greater than in the Lister family, in spite of the fact, that practically speaking, they live under the same conditions.

If we examine table 4 further, we find there that the number of cripples is rather small (16), and suicide is rare (6 cases). Persons with psychical defects are, on the other hand remarkably numerous (9.54 % of the whole number). Weak intelligence is a very prominent defect.

TABLE 4.

FAMILY PATHOLOGY.

	Specification of defects		A. 1,909 decendants	B. 241 outsiders married into the family	C. 34 additions	D. 48 illegitimate	E. The whole material 2,232 persons	Percentage		
I.	*Tuberculosis*		72	19	—	1	92	4.12		
	Cripples		15	—	—	1	16	0.72		
	Suicides		5	1	—	—	6	0.27		
II.	*Psychical taints:*	Debilitas	63	3	—	5	71	3.18	9.54	
		Imbecillitas	34	2	1	2	39	1.75		
		Idiocy	7	—	—	—	7	0.31		
		Mental diseases	44	5	2	—	51	2.28		
		Psychopathy	44	1	—	—	45	2.02		
III.	*Serious nervous di eases:*	Epilepsy	6 (8?)	—	—	—	6 (8?)	0.27	1.75	11.29
		Myokl.-epilepsy	13	—	—	1	14*	0.63		
		Paralysis agitans	7 (9?)	—	—	—	7 (9?)	0.31		
		Hysteria	3	—	—	—	3	0.13		
		Other forms	9	—	—	—	9	0.40		
IV.	*Moral and social defects:*	Alcohol I Alcohol misuse	138	34	6	1	179	8.02	12.10	15.23
		Alcohol II Chronic alcoholism	55	33	3	—	91	4.08		
		Criminality and Defects of character	43	4	2	—	49	2.20	3.14	
		Lewdness	14	7	—	—	21	0.94		

* There are in addition 3 cases of myokl.-epilepsy, but they belong to a branch who had removed from the district.

More serious nervous complaints appear (1.75 %). It is remarkable that only a few serious cases of hysteria appear. Paralysis agitans (Parkinson's disease) a grave nervous disease appears in a certain branch of the family (7 genuine cases, possibly 9). That such an unusual illness appears in this way, concentrated within a certain branch of the family, seems to me to be conclusive evidence that heredity, even regarding this disease, is an important factor.

We must remember that it is a disease which attacks persons when they have reached an advanced age, so that a large number of those who perhaps have the propensity, die before the disease breaks out. Diseases which specially attack the aged, even if they are (according to Mendel) inherited as a recessive attribute, appear comparatively, seldom.

A large number of drunkards are found in the family (12.10 %).

In addition to alcoholism we find other moral and social defects (3.14 %).

As family diseases we find, in addition to the before-mentioned, paralysis agitans, and the progessive myoklonus epilepsy, mental diseases, (dementia praecox in different forms).

In my original treatise I have paid particular attention to the above.

To explain the reasons for family degeneration I have made several groupings of the different households in the family. The material has been divided into groups according to the absence or presence of taints in the parents.

Table 5 is, as it were, summary of several foregoing tables, worked out for the purpose of explaining this matter. I shall now proceed to further examine the above table.

TABLE 5.

DIVISION OF THE MATERIAL INTO HOUSEHOLD GROUPS ACCORDING TO PRESENCE, OR ABSENCE OF PARENTAL TAINTS.

Division into groups	Number of households	Number of children	Average no of children in each family	Dead before 5 y. of age		Healthy over 15 years		Defects		Defective persons		Very defective persons	
				Number	%	Number	Percentage of survivors over 5 years	Number	%	Number	%	Number	%
I. No taint	30	148	4.9	27	18.2	85	70.3	23	15.5	22	14.8	2	1.4
II. Tuberculosis	14	52	3.7	19	36.5	22	66.7	8	15.4	8	15.4	1	1.9
A. Nearer relationship	15	108	7.2	35	32.4	39	53.4	29	26.9	23	21.3	10	9.3
The whole material	**240**	**1,391**	**5.8**	**332**	**23.9**	**556**	**52.5**	**452**	**32.5**	**372**	**26.7**	**134**	**9.6**
III. Alcoholism	37	213	5.8	56	26.3	69	44.0	84	39.4	70	32.9	26	12.2
D. Closer relationship 2 or more successive generations (and other taints)	12	95	7.9	34	35.8	23	37.7	44	46.3	36	37.9	17	17.9

The whole material comprised in this table contains, as we shall see, only 240 households with 1,391 children, instead of 377 households with 1,909 children, as before stated. This deviation is due to the fact, that those families in which only children under 15 years are found, must be excluded in an analysis of this kind because the generation cannot be, with certainty worked out in such cases.

Group I, comprises 30 households with 148 children. In these no parental taint appears, nor any relationship between such parents.

Group II, contains 14 households with 52 children where tuberculosis is the only parental taint.

Group A, comprises 15 households, with 108 children where the only taint is close relationship between the parents (cousins or second-cousins).

Group III, contains 37 households with 213 children where one, or (in exceptional cases) both parents were alcoholists, otherwise, no taint.

Group D, contains 12 households with 95 children. Parents were cousins, and closer relationship, is found in one or two former generations.

The children in these households obtain a comparatively large »loss of ancestors», as genealogists say.

If we now compare the numbers in table 5 we find that children in group I, where no parental taints are seen, have proved to be decidedly better than those in any other group. The number of children who have died before 5 years of age, is least here, and the number of healthy persons over 15 years is greatest. The number of »defectives» is considerably less than in the other groups.

In the tuberculosis group, mortality is greatest, and nativity least, but even here »defectives» are not particurlarly numerous.

Group A, the relationship group, shows as a rule average rates.

The alcoholist group (III) shows considerably more disadvantageous rates of percentage (see table).

The worst group is D, where closer relationship is found in 2 or more successive generations, the mortality, in children of tender years is, in this group, particularly high, and the nativity also. The number of »defectives» is also great. Very defective persons appear at the rate of 17.9 %.

The children who have been unfortunate enough to be born in these households, have paid dearly for the ignorance or imprudence of their parents when marrying. The pitiable consequences of marriages with relations in this unhappily situated family, has been noticed to a certain extent by the inhabitants of the district. Especially persons of other families residing there, but also nembers of the Lister family have apparently been aware of the menace. Most marriages however take place in this district, for economical reasons. When it is a question of retaining a home-stead within the family, which has been in its possession for a long time, all consideration for offspring is forgotten. In this district crass egotism still prevails, not only in this family, but in many others in the country, where one would have expected better.

The race-hygienic principles will lay the foundation for a higher and better form of ethics, than obtains now, when these ideas become thoroughly, rooted in the mind of the people at large.

These comparisions give us an interesting insight into the biological structure of the family, if I may use such an expression.

They show us amongst other things, how difficult it is from a large mass of material, to separate groups of households where no, or only one, parental taint appears, a grouping which permits certain conclusions to be drawn touching the importance of one or the other taints in connection with offspring.

So much however we learn from these groupings, that the original constitution, such at it has developed during a hundred or thousand years, is of great significance. That inauspicious racial blending in former times, is of signification, as before mentioned. Relationship marriages have a very injurious effect in just the family in question, thats is to say, hidden (recessive) propensities appear. Such is not the case in families enjoying favourable constitutions (genotype). Relationship marriages on the other hand, in such families have a beneficial effect. Scientific investigators now agree that consanguinity has both the good and bad effects named.

Marriages with relations can be described in other words as a two-edged sword, in one case being beneficial, in the other injurious, depending upon the different nature of the families.

The conclusion arrived at regarding one family, cannot be correct for the other.

One must be careful not to generalize ones experience, for life is more complicated than we generally believe it to be.

Another reason for the collapse in the Blekinge family is the abuse of alcohol. We are yet unfortunately, very ignorant as regards the part which alcohol plays in damaging the so called germ-plasm.

»Culture» nations would certainly be wise in doing their utmost to solve questions of this kind. It will be a very important mission for race-biological institutions, which should be organized in all countries. Their investigations should be carried out with the greatest thoroughness, and they demand much material, which would claim much time and expense. We cannot, by any means, be satisfied with the knowledge we at present possess. The weal and wol of future generations, depend in many respects, upon what we do or omit to do.

THE STRUGGLE FOR RACE-IMPROVEMENT IN SWEDEN

BY

Professor J. VILH. HULTKRANTZ and Dr. E. BERGMAN

UPPSALA

IN SWEDEN — AS EVERYWHERE ELSE IN THE WORLD — IT IS first during the last decades in reality, that one has arrived at the knowledge that our efforts to protect the race against degeneration and raise its level only by an improvement in the environment (euthenics) are tolerably fruitless, and that the most effective means of reaching this goal is by a favourable selection of the parents, through whom good qualities can be transmitted to the next generation (eugenics). Thus it is of importance to seek to hinder, as far as possible, the reproduction of inferior individuals, and to increase the nativity among the better stock instead, as well as to prevent immigration of inferior, and emigration of the fittest individuals. It is the discovery of the laws of heredity together with the favourable results of modern breeding of plants and animals which has brought about this inversion of our ideas of the race-problem.

In the *Swedish legislation* from older times though, there is to be found an interesting example of clear insight respecting the right way for race-betterment. In the preamble to a law promulgated in the year 1757 forbidding marriage to those having falling sickness it says: »And inasmuch as, according to the humble report issued by Collegium Medicum, the most experienced medical men from the oldest times have agreed, that a true falling sickness called epilepsia idiopathica, is reproduced by the parents in the children and children's children; and as daily experience attests that scarcely any are burdened with this grave malady, so long as none of their forefathers, on the father's or on the mother's side, have been afflicted with falling sickness — — — for this reason and because We find the only means of rooting out gradually the true falling sickness, to be, to forbid marriage altogether for the persons, be they men or women, who are troubled herewith, it is Our gracious will and command» etc. — Statutes which could work in an eugenic direction are certainly to be found among some of the older laws, such as the Mosaic, but in the Swedish statute just mentioned it seems to be the first time that the intention of protecting coming generations has been distinctly pronounced, and it is therefore we have given this detailed quotation. The hopes, that by these means epilepsy could gradually be rooted out, have unfortunately not been realized, chiefly on account of the difficulties met with in carrying out the law rigorously. Epilepsy is still rather common in Sweden. The number of those having falling sickness is very probably at least 7,000. With the enrolment of conscripts during the last years, something over 2 per thousand of the men examined have been rejected on account of this malady.

In the old marriage act of 1734 which was in force down to 1915 it was expressly enacted that epilepsy was an impediment to marriage, but in practice such mental affections as entailed incapacity to enter into a legal agreement, were also an impediment to marriage. On the other hand it was enacted that »incurably infectious disease» was sufficient ground for invalidating a marriage, whereby in all likelihood venereal disease in an infectious stage was meant.

In the meanwhile at the beginning of this century more and more voices were raised emphasizing the duty of society to provide for the mental and bodily health of the race, demanding legislative measures preventing the marriage of persons who in medical and eugenical respects are not suitable for it. For this purpose motions were raised which, among other things, insisted upon obligatory medical examination before marriage was entered upon. These were rejected by Parliament, but when the marriage law must be revised owing to other reasons, the *Faculty of Medicine in Uppsala* was consulted respecting its opinion as to what ought to be the ground for the new law from a medical point of view. The opinion of the Faculty of Medicine, with which the Medical Board agreed on the whole, can be looked upon as a good expression of the position taken at that time (1911) by Swedish medical science towards eugenical questions. We shall therefore give an account of what it chiefly contains. The Faculty pointed out to begin with, that as the legislative measures, which from a medical direction must be insisted on in regard to the eugenical importance of marriage, are in a greater or less degree intended to reduce the already low percentage of marriages, they must on that account be proposed with great care and restricted to fit the circumstances where they are most needed. Great care is urged in taking measures, both by the difficulties of applying them practically, as well as by the possibility that they can be avoided by means of illegitimate sexual relations when marriage is not allowed. In certain cases it might be made possible to obtain a dispensation to marry, as in the case where there are already children who could thus be made legitimate, and when from one or the other cause it is quite certain that reproduction is precluded.

The Faculty proposed that it should be enacted that the following might be taken as forming an impediment to marriage: 1) falling sickness, when not caused by external reasons, 2) mental disease and mental debility actually present, mental disease in the past, not caused by external reasons, also mental and moral defects in a severe degree from which specially great danger might be anticipated for the mental development of the posterity, and, 3) venereal disease in an infectious stage. In the meanwhile in the two first mentioned cases it ought to be possible, after the presentation of a certificate from a qualified medical man to obtain a dispensation in certain cases. Anyone who is, or can with reason be suspected of being affected by any form of falling sickness, as also anyone who has been mentally deranged or whom there is good reason to suspect of being afflicted with mental disease, mental debility or any other psychical abnormality of the kind just stated and also those who have been condemned for greater crimes, for repeated offences or convicted of vagrancy, ought not to be allowed to marry without the production of a medical certificate, accepted by the Medical Board, showing that he must not be considered to be affected by any such

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malady, arrest in development, or abnormality in the mental life which might be an impediment to marriage.

With certain stated restrictions the above mentioned diseases ought to be allowed as grounds for the annulment of marriage, or for divorce. If one of the married pair had become mentally diseased, and continued so for three years, and if according to a certificate given by the proper medical man there was no reason for hoping that a lasting return to health could be expected in the insane person, the Court ought, if the other party to the marriage desired it, to grant a divorce. In the same way it ought to be enacted that venereal disease, if caused by adultery or other inchastity, or if the sick person has infected the other party, or exposed him to danger of infection, shall also give grounds for a divorce.

Although from a eugenic point of view it perhaps might be desirable to enact that an impediment to marriage is found with alcoholists, and persons suffering from leprosy, or tuberculosis in a high degree, as well as for deaf-mute persons, and others suffering from bodily defects or disablements yet the Faculty from practical reasons considered that they ought to refrain from demanding this and rested their hopes upon the increasing knowledge and sense of responsibility.

Regarding the minimum age for marriage, which in our country has been 21 years for the man and 17 for the woman, the Faculty gave a warning against sinking it to 16 years in accordance with the Danish and Norwegian law, which had been brought into question.

The old law did not allow persons, standing in any nearer relation to each other than cousins, to marry. The Faculty did not consider that any alteration ought to be made in this law.

From practical reasons and not to make it unnecessarily difficult to enter into matrimony, the Faculty considered itself obliged to restrict its demands for medical examination before marriage to the cases already stated, notwithstanding that it saw fully the medical justification of the proposal for making examination of the nupturients by a medical man statutory, whether with or without a qualified certificate, which was raised not only by medical men, but also by motions in Parliament.

Although the proposal of the Medical Faculty must be considered as moderate in a high degree, it did not win the approval of the legislators in every way. The law committee who modified the proposal, took as the chief foundation that the entrance into matrimony ought not to be made more difficult, and it must also in a high degree take into account the great difficulties which are met with in the practical appliance of the law.

Our *marriage law now in force* of the 12th of November 1915, contains therefore prohibition of marriage for persons suffering from epilepsy, produced by preponderating internal causes, mental disease and mental debility, as well as sexual diseases in an infectious stage. Before the marriage takes place both the contracting parties must declare in writing on their honour and conscience, that they are not suffering, according to their knowledge, from true falling sickness or sexual disease. If a person has been insane during the last three years or if there is any cause for believing that he suffers from mental disease or mental debility, he must show by means of a doctor's certificate that there are no signs

that he is suffering from the disease in question. In certain cases it is enacted that the occurence of these maladies, as well as the misuse of intoxicating means, may be taken as grounds for invalidating the marriage or for divorce. It is enacted that the minimum age for entering into the marriage state shall be 21 years for the man and 18 years for the woman. Marriage between a person and one of his brother's or sister's children is not allowed without a special dispensation.

Although it had been desirable that the law in several points had been more rigorous one must feel glad over it, because it implies a tangible advance from the eugenic point of view. The most important innovation in our new marriage law, are the regulations respecting sexual disease in an infectious stage, as an impediment to marriage.

The reproduction of eugenically undesirable individuals can be hindered not only by prohibiting marriage for them, but also by means of *segregation* and *sterilising* and these modes of proceeding are much more effective than prohibition of marriage. It is self-evident that with us, as in other countries, insane persons and criminals are interned. In the meanwhile the extent to which this takes place, is much too small. The object one has in doing it is namely, only to protect society against unpleasentness, and not to protect the coming generations from an increase of worthless individuals. Strong voices have been raised insisting that more vigorous measures should be taken especially regarding habitual and sexual criminals, who should not be set free after working out their punishment, but should be interned for life. — No regulations are found in Swedish law which allow the sterilising of eugenically inferior individuals. The Medical Faculty touched on this question also, but considered that regulations respecting the sterilisation of physical and mental degenerates by means of operating, ought not to be introduced before public opinion has been well-prepared to support it. The question has been discussed among doctors and one or another of these have, with the consent of the patient, sometimes performed an operation for sterilisation on account of eugenic indications. Sterilisation is a necessary complement to prohibition of marriage and it is therefore to be hoped that the general public will be brought gradually, by means of continued efforts for their enlightenment to a right understanding of this weighty question.

Immigration to Sweden implies not so seldom a danger for the future of the Swedish race and above all because especially during the latest years an invasion has been taking place from the East, where the human material, in respect to the mental and physical qualities of race, can hardly match itself against the ancient Swedish population. During the great war, asylum has been granted to a large extent and for a longer time to unlucky fugitives, permission for their naturalisation has fortunately been granted with great carefulness. Voices have been raised asking for more severe regulations in respect to immigration. The number of immigrants according to official statements the year before the great war broke out was 8,407, but it was and still is in reality appreciably larger.

The drain which *emigration* ever since the middle of the last century has been for our nation, has certainly acted in a weakening way on its vital power. Out of Sweden's population, which is near to 6 millions, twenty to thirty thousands emigrate yearly. During the years between 1851 and 1910 about 1 1/4 million

Swedes left their fosterland and settled in foreign countries, mostly in America. At the present time 2 to 3 millions of Swedes are living in foreign lands (the Swedes in Finland included). As it is the young and strong who preferably emigrate, the statistics in respect to the people, divided into classes according to age, are less favourable. Added to this there are the rigorous laws on immigration, which have been in force during these latter years in U. S. A., whither the strongest stream of emigrants has wandered, and which have brought about a selection, so that the worst elements have been obliged to stay at home, while the better elements have been allowed to enter America without any hinder. As through this our country has lost no small number of fully satisfactory, from a race-biological point of view, individuals and their offspring, one can concerning this matter talk about a for us contra-selection respecting emigration. In hopes of mending the matter, the state has started an exhaustive investigation respecting emigration. And further the National Society against Emigration has been working in the matter since 1907. It devotes itself partly to bringing enlightenment to the people, and partly to practical work especially in procuring small holdings and own homes for the people. If the more efficient individuals are offered better chances of making a home and settling down in Sweden, and of becoming parents, the result will be a good addition to the next generation. The struggle to prevent a too great amount of emigration, acts therefore in a for Sweden positive eugenic direction.

Industrialism also, and the flight from the country to the towns, works in an anti-selective manner. The unfavourable effects of the former, one has sought to avoid or to reduce as far as possible, through legislation on the matter. Our legislation to protect the workers, which has a long pedigree, stands at present tolerably high. Regarding the employment of children in industry, there are to be found detailed instructions which are intended to prevent the children from being given too heavy work, such as might do harm to their development, too early in life. In the same way there are to be found certain exceptional regulations in respect to women industrial workers, as for example, that they are to be allowed a free time both before and after the birth of a child, during which time they can obtain pecuniary assistance also (Maternity help). Since 1919 the time for work has been restricted by law to 8 hours per day or 48 hours per week.

In regard to the *migration from the country to the towns* over a quarter of Sweden's population live in the towns at the present time, while in 1800 only a tenth did so. If one reckons all the thickly settled tracts, having at least 2,000 inhabitants as belonging to the towns, the number of town-dwellers reaches at present to about a third of the population. Above all the circumstance that people dwell so closely packed together, the greater extent of inebriety and sexual diseases, and, as a rule, the more unhygienic work in the towns actsun favourably on their inhabitants. A danger that is underrated is the strong mixture of blood which usually occurs in industrial centres which flourish rapidly. It is of importance that sound state-craft should be brought to bear on the subject of dwelling houses in the towns. During the latter years a considerable improvement has certainly taken place till the war came with its unfavourable consequences, which were felt even in regard to the housing question. Some of the larger industrial inter-

prises have arranged the housing question for their workers in a excellent manner. The larger towns have made great sacrifices to help forward the question of own homes for the people. Even the State has granted means to facilitate the starting of own homes and small holdings out in the country. Motions have also been raised in Parliament respecting measures for keeping the youth of the country-side on the land, although at present without any especial success. It is to be hoped that this question can soon be taken up over the whole line, and be made the object of a thorough investigation. The Swedish statisticians and sociologists P. Fahlbeck, G. Sundberg and N. Wohlin have during many years, devoted both time and strength to answering these questions. It is namely of the greatest importance that our old peasant stock shall be preserved and that the nativity within these circles, which can be considered as the eugenically more valuable, does not diminish too fast on account of the state of affairs within the agricultural world being altogether too low.

One cannot of course by means of peremptory language compel *the best individuals* to *increased production of children*, but one can lighten the way to parentage for them and reduce the burden of a large family of children. The voluntary restriction in the number of children, especially among the better situated classes, has unfortunately with us, as in other places, become more and more common. Thus while the frequency of marriage has increased a little during the last few years (6.9 ‰ 1919), the frequency of birth has steadily declined (19.6 ‰ in 1919 and 25.6 ‰ in 1909). The increase in the population is small (5.7 ‰ in 1919). A law was passed in 1911 against preventive means, but it has not acted in the manner contemplated and up till now it has not been possible in any other way either to amend the evil. The best way without doubt is to try to lighten the economical troubles of the breadwinners. The State ought to support their endeavours to win a home of their own, which is of all the more importance as families having a large number of children often have a great difficulty in renting a flat or any other place. During hundreds of years we have enjoyed the great advantage of free education or of its costing only a small fee, which has been a considerable relief for the fathers of families. It has also been of great importance for the circulation of the classes, which has existed in our country since the olden times, and thanks to which children from the peasant and middle classes through their personal ability can work their way upwards to the highest honours the state has to give. During these last years by means of supplemental wages and reduction of the rates and taxes for family-fathers an attempt has been made to improve their financial position. The advantages the breadwinners have gained in this way, have however up to the present been so slight, that any real effect can hardly be expected. One is going quite certainly to proceed further upon the way marked out. In the meantime it is of importance that such advantages should be reserved for indivuals who are satisfactory from the race-biological point of view, and who can be expected to leave a good posterity, and that it should not be dealt out with too niggard a hand.

The fight against the so-called *race-poisons*, above all against alcohol and syphilis, are carried on intensively. It is perhaps of more importance for the private individual and his surroundings, but has also, at least indirectly, some im-

portance for the coming generation. Besides being assigned some etiological significance in the occurrence of a large number of the hereditary diseases, the venereal diseases can also cause sterility, miscarriage and inferior offspring.

Temperance work has been carried on in this country at least since the middle of the last century. Among its pioneers and leaders, the clergyman and popular speaker Peter Wieselgren (1800—1877) must be placed first, personally he was a total abstainer from 19 years of age, thus long before the temperance movement began anywhere in the world; and the renowned doctor Magnus Huss (1807—1890), author, among other works, of »Alcoholismus chronicus», one of the most noted books among the temperance literature, must also be mentioned by his side. Our five greater temperance societies had, when they were at their greatest in 1910, about 350,000 adult members, in round numbers. Since then they have suffered some decrease, so that the number of members at the beginning of last year was 275,000. To these must be added the societies belonging to the Free Churches, which first in 1920 took up temperance work, and whose members are reckoned as going up to 205,000. The legislation in the cause of temperance has during the last few years, gone in the direction of personal restriction. As the result does not seem to be that which one had hoped for, a strong opinion is in course of bulding in favour of the introduction of total prohibition. In connection with this the sinking numbers of members belonging to the temperance societies have begun to rise again.

The frequency of the *venereal diseases* in this country has without doubt risen during recent years. Since 1912 the duty of reporting these diseases has become law. The whole number of reported cases was 30,429 (5.2 ‰) in 1919, of which 6,451 (1.1 ‰) were syphilis cases, 20,651 (3.5 ‰) gonorrhoea and 3,327 (0.6 ‰) were chancre. In the meantime these numbers represent a minimum and the real frequency must therefore be essentially greater. The fight against sexual diseases is consequently a very important social question. Besides the part of the marriage law, which prohibits marriage for those suffering from sexual disease in an infectious stage (it is the duty of a doctor to report anyone who defies the law), we have since 1918 a law against the spreading of sexual disease. Regulations are joined to the law partly in regard to the treatment free of cost of those suffering from sexual disease and partly in regard to the duty of the doctor giving the treatment, to report the case; negligence can lead to forced treatment of the contumacious person. To expose others to the danger of infection may involve severe punishment. An inquiry has also been made by a committee concerning the measures to be taken for spreading a knowledge of sexual diseases. In the scheme recently propounded it was proposed to carry out a systematic educational work in the schools as well as among elder persons. As the before mentioned preventive law makes this work of enlightenment more difficult, it is proposed to revise it.

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It is naturally of great importance that a good hereditary disposition shall, thanks to favourable outward circumstances, reach full development. Everything working in this direction we comprise under the word *euthenic*. That the

temperance movement makes considerable contributions in this area, by an improvement in the environment, is easily seen. General hygiene, sport, protection of the workers, especially the regulations respecting workers under age, which have been mentioned before, and measures for the protection of children born out of wedlock, can all be looked upon as euthenic activity. In this country 20,000 *children* are *born out of wedlock* every year. By means of the law of 1917 the dreary position which was often their lot before has been considerably improved. The law assigns to these children the right to be brought up and educated at the cost of their parents in a way suitable to the financial and social position of both parents. To make sure that the children receive the benefit of the advantages the law gives them, a guardian is appointed for every child born out of wedlock, and every community has its »Board of Guardians for Children», who take in hand all matters connected with these children, as well as watching over the children born in wedlock to make sure they are not neglected. This law most certainly will be the means of saving many children, and making them useful members of society.

Great attention has been paid in Sweden as is the case in many other countries to *bodily culture*. The man of mark in this connection is Per Henrik Ling (1776—1839) who won a world-renowned name for Swedish gymnastics. The Central Gymnastic Institute founded by him in 1835 has been of great importance for the further development in a sound direction of the Ling gymnastics and has on the whole exercised a momentous influence on the development of bodily culture in our country. The Swedish gymnastic has also made a triumphal progress throughout the world and has been transplanted to most of the civilised countries. In this connection it ought to be mentioned that in 1874 the College for Sloyd-teachers was opened at Nääs; since its opening it has received a large number of teachers from all parts of the world. As well as the pedagogic sloyd (Nääs system) it has held courses for the education of game-leaders and instruction courses in gymnastics. The old Swedish folk-games and folk-dances have been cherished here and have awakened great interest in the foreign teachers taking part in the courses. Interest for pure *sport* is great, but considerably less among the students than among the younger industrial workers and labourers. Unfortunately sport seems to be degenerating more and more, which is much to be regretted, and the matter is not helped by the fact that its development has gone in the same direction in other countries. If our students bestowed more interest on gymnastics and sport, it would perhaps be easier to bring back sport into the right track again. The Society for Physical Culture has been working for several years for the advancement of bodily culture.

For the furtherance of folk-hygiene the following means may be mentioned: cheap baths for the people, free baths for school-children, the sending of weak and poor children to settlements in the country in the summer, the arrangement of open air games, allotment gardens, etc. Such measures have been taken to a very great extent. Added to this care of the health, comes the care of the sick of which only the work in connection with *anti-tuberculosis*, which is of the greatest importance socially can be mentioned here. In this country about 10,000 (about 2 ‰) people die yearly of tuberculosis. The death rate from tuberculosis

is about 14 % of the total death rate. As it is usually young persons who are attacked by the disease, it is easy to understand what a fearful part tuberculosis plays even in our country. In the fight against it, the Swedish National Society against Tuberculosis has since the year 1904 done very serviceable work. This society which carries on an exhaustive work in the way of enlightenment, and supports practical anti-tuberculosis work has during the most recent years especially interested itself in the prevention of tuberculosis and in work among the children. Besides dispensaries which have been found in Sweden since 1905, the National Society against Tuberculosis has even founded homes for children threatened with the disease, and has supported colonies for them out in the country, among others the settlements, started by the Abstinence Association of Swedish Students (S. S. U. H.), for healthy children coming from infected homes. By these visits to the settlements it is intended to strengthen the children so that they have a better chance of conquering in the fight against tuberculosis in their own homes. In this way or by some other means, e. g. by taking the children from their homes at the earliest age possible (preferably at their birth, if the parents are already consumptive), to try to prevent tuberculosis must be of the greatest importance. The settling of the dwelling-house problem ought also to give good help to the anti-tuberculosis work. During some years a Royal Commission has been at work arranging a united programme for our anti-tuberculosis work in the future. This will pay the greatest attention to the prophylactic anti-tuberculosis work, especially among the children.

It is of especial importance that when reforms are close at hand, the general opinion should be led in the right direction through *educational means.* This work of educating the people is supported by large grants from the state, and consists of lectures, circles for study, public libraries etc., during recent years it has done a great deal towards raising the people. The work of enlightenment has embraced the most widely separated subjects even including medical and hygienic lectures. In regard to the position taken by the workers towards eugenic questions, the following quotation from a recently published pamphlet (General information on educational work), given out by the Worker's Educational Union (A. B. F.) is significant: »Our educational organisations must not stand any longer either, as strangers towards physical training. One must learn to understand that all mental advancement is impossible in the long run, without one has good human material to work upon. The mental culture must be complemented by bodily culture — — —. Those who have the arrangement of lectures ought to see that the subjects of race-biology and eugenics, personal and social hygiene, and other branches of physical education are taken up very extensively. These subjects are also especially suitable for the circles for study.» Among the popular lecturers on all that belongs to these subjects Professor Lundborg stands in the first place, he has carried on an inclusive work by means of popular lectures and phamphlets in medical hygienic, and before all in race-biological and eugenic subjects. Several other University professors have also treated these subjects popularly.

The temperance movement has most certainly been a powerful lever in the spreading of social knowledge and in waking a sense of social responsibility in the Swedish nation. During recent years the Temperance Societies have more

than ever before devoted themselves to the work of social enlightenment among the people, this concerns especially a number of organisations for young people such as the Abstinence Association of Swedish Students (S. S. U. H.) and Sweden's Good Templar Society for the Young (S. G. U.), which have also taken up as a subject for study the tuberculosis problem and the race-biological questions. Since 1901 when the Central Society for teaching Temperance was started, the Society has arranged altogether 97 popular-science courses. During recent years, some hours out of every course have been devoted to lectures on heredity and its application to mankind.

Since 1909 The Swedish Society for Race-hygiene has been at work in this country. It has taken as its task to advance eugenic investigation, the spreading of enlightenment in questions connected with this subject and to »support scientifically founded struggles for the physical and mental health of the rising and coming generations». Grants have thus been made, among others, towards the publication of Professor Lundborg's great work on a degenerate Blekinge family, and the Society publishes a series of popular eugenic pamphlets.

THE SWEDISH NATIONAL-TYPE EXHIBITION 1919

BY

EMANUEL BERGMAN

UPPSALA

IN THE SPRING OF 1918 A NUMBER OF UNIVERSITY ASSOCIAtions in Uppsala, well-known as the seat of Sweden's oldest and greatest University, sent out an appeal to those interested in the matter, begging them to collect material for a Swedish National-type Exhibition, which it was hoped to arrange in the near future. The real originator of the idea of such an exhibition was the race-biologist Professor HERMAN LUNDBORG. This scientist, who during a number of years has carried on, under difficult outward circumstances, devoted and especially successful investigations in race-biology in this country, has also been warmly interested and taken a leading position when it has been a case of bringing enlightenment to the Swedish people in questions of race-biology and eugenics. He has unusual ability both in speaking and writing, of sharing his knowledge with others and of imparting to the general public something of the interest and enthusiasm for questions of eugenics, which inspire him to such a high degree. This work of enlightenment, judging by results, has begun to bear good fruit. For great interest was shown for the National-type Exhibition. Contributions poured in profusely from students, scientists, artists, photographers and others, and the material was so extensive, that it was not possible to get it all arranged before some months had passed of the following year. When in March 1919 the Exhibition was opened in Stockholm, it became at once a veritable public success. The people visited it in masses, and the newspapers, no matter what their political stand-point might be, paid it great attention. One can say that the Exhibition on this occasion brought about a real national assembly. At the beginning the intention was only to hold the Exhibition in Stockholm and Uppsala, but very soon the proposal to make it of an ambulatory character, became more and more decided, so as to give the inhabitants of the larger towns an opportunity of seeing it. In this way the National-type Exhibition came to be held, not only in the two above-mentioned cities, but also in Gothenburg, Gävle and Visby. The interest shown by the people in general was magnificant the whole time. In Stockholm about 10 per cent of the grown-up inhabitants visited the Exhibition and in Uppsala the percentage was no less than 40. One could therefore rejoice over the fact, that the support had broken the record, for perhaps no previous exhibition had received so much patronage in our country.

What was the meaning of this Exhibition? As Mr. Lundborg has specially pointed out, upon different occasions, scientific investigation has, up to the present, chiefly devoted itself to the most minute examination of nature — organic as well as inorganic — but when it has been a question of studying mankind, the highest of all nature's productions, one has, as a rule, confined oneself to giv-

ing an account, certainly not less minute, of the products she has created, or one has gone on exploring expeditions to foreign lands, to make a careful study of people who are still living in a state of nature, and to observe their manner of life. On the other hand one has never practically speaking, aimed really consciously at making a study of civilized man, that is to say, of ourselves, or of investigating our own nature and our own disposition. Before discussing the question of taking measures in eugenics to improve a people, one must have obtained an inclusive knowledge of its internal structure, of its good and bad qualities. In other words, one must make a race-biological inventory of the people, so as to ascertain the presence of different types of race and to estimate the value of their qualities. The Swedish National-type Exhibition can be regarded as a link in this work.

The collected material consisted for the most part of portraits which had, to a very large extent, been taken for a race-biological purpose, which of course enhanced their value. The collection was arranged in a manner easy to survey and in an instructive way, and was divided into several different departments. By means of charts and diagrams, the first section gave a general survey of the Swedish race, with an account, according to height, shape of skull, and blue eyes, of its distribution in the different provinces. There were also pictures showing the different types of race, for example, the pure Nordic type, Walloons, the Finnish and Lappic types, Jews and Gipsies, as well as other foreign types. To this section belonged also, a very instructive collection of casts made from living models by Professor G. Backman, for an anthropological purpose, and which represented Dolico-, Meso- and Brachycephalic types.

After the first section's orientation over the principal National-types in Sweden, the second and third sections followed with a copious supply of race-types, in which particular attention was given to transition types especially from the most northern part of Sweden, where Swedes, Finns and Lapps live together, and have to a very considerable extent, become blended together. A great many peasant types from most of the Swedish provinces were represented. One had now an opportunity of studying a rather plentiful and very interesting collection of gipsies, »tattares», as well as vagabonds and criminal types. Another section showed the Swedish race-types grouped according to social status, as workers, students, sick-nurses, doctors, clergy and military men, higher civil servants, professors etc. There was also a collection of portraits of well-known Swedish men and women, among whom the authoress Selma Lagerlöf was to be remarked, as well as the author Verner von Heidenstam and others. A special section gave some characteristic pictures of Swedish race-types from Finland, Åland and Runö.

The section for family-groups was perhaps the most weighty in the Exhibition. Here were shown a number of Swedish families, important from a cultural point of view, together with their family trees, and portraits of now living members of the families. Among the families represented, could be remarked that of De Geer of Finspång, which immigrated to Sweden from Holland in the seventeenth century, the Jewish family of Josephson, the scholarly families of Petrén, Fries, Holmgren, Aurivillius, Key, Santesson-Lovén, Retzius-Hierta, Nordensson, Ångström and others, all remarkable in the field of science.

Swedish artists have also contributed to the Exhibition. One found again Wilhelmson's fisher types from Bohuslän, Albert Engström's Roslagen types (»Rospiggar») and Gunnar Hallström's types from the provinces round Lake Mälar.

Lastly tables were exhibited by which were shown clearly the hereditary course of inherited disease, with dominant and recessive inheritance of the morbid disposition.

A large number of prizes had been placed at the disposal of the Exhibition which made it possible to encourage those taking part in the competition for the best portraits or collections of portraits. Among the donors who by their gifts assured the economical position of the Exhibition was the world-renowned artist, since dead, Anders Zorn, who subscribed 5,000 Swedish crowns.

In connection with the Exhibition a number of wellknown scientific men, such as professors O. Montelius, C. M. Fürst, J. V. Hultkrantz, Lundborg and N. von Hofsten, gave lectures on race-biological subjects which were well attended. Professor Lundborg and his assistants also demonstrated the portraits and other objects in the Exhibition, at least once, but more often, several times a day.

It was intended, in addition to collecting portraits and material for future elaboration when the collection became more complete, to open the eyes of the general public who visited the Exhibition, by means of its profuse supply of pictures, to the eminent importance of good race characteristics in a people, and to awaken sympathy for, and love of, one's own people. This purpose was attained also, and to no small extent either. The increased interest for heredity and eugenics which we have witnessed in this country during the last few years, must be ascribed to a not inconsiderable extent, to the merit of the National-type Exhibition.

For the purpose of making the effects of the National-type Exhibition more permanent, and of letting as many as was possible benefit by it Professor Lundborg at the same time published a very instructive book, popularly written, with the title of »Race questions in modern light», which contained a number of articles, written by experts, on the Swedish nation, its origin and race characteristics, together with an account of the foreign races in this country. There were also some articles on heredity and race-biology as well as on eugenics. Another book was also published containing plates with reproductions chosen from the pictures which the National-type Exhibition had brought together. This work »Svenska Folktyper» (Swedish National-types), which came out at the end of 1919 contains about 800 photographs arranged according to race-biological principles and is preceded by an orientating introduction by Professor Lundborg. A number of these plates are also included in this book. It can surely be said of this work as of the National-type Exhibition, that it is unique of its kind, not only in our own land but in the whole world also.

Thus one can say with confidence that the Swedish National-type Exhibition has succeeded particularly well. As a link in the work of enlightenment in race-biology, such an exhibition has certainly a not inconsiderable task to fulfil. The trial invites to imitation, and it is to be hoped, that the same kind of experiences will be met with in other countries, where as we suppose, exhibitions of this kind will soon be taking place also.

SOME ANTHROPOLOGICAL DATA ON THE INHABITANTS OF SWEDISH AND FINNISH EXTRACTION IN FINLAND

BY

Doctor KAARLO HILDÉN

HELSINGFORS

IT IS ONLY FIRST DURING THE LATEST DECENNARIES THAT the anthropology of Finland has been investigated scientifically. Of older explorers in this department we may specially mention the celebrated Swedish scientist ANDERS RETZIUS, of Stockholm, the Finnish scientist C. v. HAARTMAN of Helsingfors and the wellknown German anatomist VIRCHOW. The material these investigators had at their command was in the meantime singularly scanty, and in consequence gave to a certain extent, a wrong picture of the anthropological circumstances in Finland. A valuable contribution to our knowledge concerning Finlands anthropology was afterwards given by the Swedish scientist GUSTAF RETZIUS, who during his journey in Finland in 1873 measured 91 individuals, took a large number of anthropological photographs and collected a large number of skulls. He published the result of these investigations in the year 1878 in his classical work »Finnish craniums». The anatomist K. HÄLLSTEN in Helsingfors has later, together with his pupils carried on craniological researches, which in the years 1881—1893 were published under the common title of »Materiaux pour servir a la connaissance des crânes des peuples Finnois». (Materials of service in giving a knowledge of the craniums of the Finnish people.) In the meantime we have the lately deceased medical doctor F. W. WESTERLUND of Helsingfors, to thank for his investigations respecting the anthropology of Finland, he instituted careful measurements and observations when the conscripts were called up in 1885—92. These researches cover in respect to the height, 131,697 men about 21 years of age from all parts of the land, excepting the Lappmark; in respect to the shape of the head and the colour characteristics Westerlund has had at his disposition a material consisting of about 6,000. Westerlund has published the result of these researches collocated in 6 volumes under the title of »Studies in Finland's anthropology», and they contain the most complete description of the anthropological circumstances in Finland which we possess up till the present. The following information therefore is derived principally from Westerlunds investigations.

Finland, as is well known, is inhabited by two different races of people in regard to their language and origin, Finns (about 88 %) and Swedes (about 12 %) of whom the latter inhabit Åland and the larger part of the south-west archipelago, as well as parts of coasts of the Gulf of Finland and the Gulf of Bothnia, in the provinces of Nyland and Österbotton, (East Bothnia). In the course of

time these two races have become mixed in a rather high degree, especially on the mainland in the south of Finland. Meantime Westerlund has shown that in spite of this, one can still prove that there are evident differences between the Swedish and the Finnish inhabitants in Finland. In the same way, grounded upon his anthropological researches he has been able to verify that there are natural race-groups within the Finnish population. West Finns (in Finland proper, Satakunta, and south Österbotton), Tavastians (in the central parts of the country), Karelians (in the eastern parts), Kävnerians (in north Österbotton). In doing this he has based his observations principally upon the following characteristics: the height, shape of head, and the colour of the eyes and hair.

The height of the Swedish population in Finland is shown in the following table:

Province	Average height mm.	Below the standard X—1570 mm. %	Short 1570—1619 mm. %	Average 1620—1699 mm. %	Tall 1700—1800 mm. %	Very tall 1800—X mm. %
Åland	1700	1.27	6.34	39.77	47.62	5.03
Finland proper	1694	1.34	7.90	41.82	45.98	2.96
Nyland	1683	2.52	10.23	44.70	40.32	2.23
S. Österbotton	1680	3.59	10.68	45.12	38.52	2.09
Average	1684.2	2.69	9.89	44.23	40.74	2.45

The height of the Finnish race-groups is seen in the following table: —

Race-groups	Average height mm.	Below the standard X—1570 %	Short 1570—1619 mm. %	Average 1620—1699 mm. %	Tall 1700—1800 mm. %	Very tall 1800—X mm. %
West Finns	1686	2.29	8.83	44.53	42.21	2.14
Tavastians	1678	3.12	11.19	45.06	37.85	1.88
Karelians	1654	7.30	18.56	48.76	24.65	0.73
Kävnerians	1644	9.25	21.65	49.20	19.50	0.40
Average	1667.8	5.05	14.34	46.96	32.29	1.37

A glance at these tables shows at once, that a considerable difference exists between the Swedish and the Finnish population: there are more very tall and the average height is greater among the former, while on the contrary it can be remarked that there are more short and below the standard as well as a lower average height among the latter. The tallest individuals among the Swedish inhabitants are found in Åland and the south-west archipelago, where the population in regard to height corresponds with the tall grown population of adjacent parts of Sweden. Hence the height decreases with a surprising regularity in correspondence with the rest of the Swedish provinces as well as to the interior

parts of the country which are inhabited by Finns. The tallest Finns are the West-Finns, whos eheight (and peculiarities of speech) indicate Germanic influence. The shortest individuals are shown among the so-called Kävnerians in north Österbotton, where the influence of the short grown Lapps has probably made itself felt.

The same differences between the Swedish and Finnish population, as well as among the different Finnish groups can also be shown in regard to the shape of the head.

By means of the following tables Westerlund has made this quite clear:

SWEDES.

Province	Average index	Index 70.0—74.9 %	Index 75.0—79.9 %	Index 80.0—84.9 %	Index 85.0—89.9 %	Index 90.0—X %
Åland and Finland proper	79.2	8.2	53.8	33.6	4.1	0.3
Nyland	79.3	7.5	52.6	37.7	2.2	—
S. Österbotton	80.2	4.1	44.8	44.3	5.5	1.3

FINNS.

Province	Average height	Index 70.0—74.9 %	Index 75.0—79.9 %	Index 80.0—84.9 %	Index 85.0—89.9 %	Index 90.0—X %
Finland proper	79.4	7.2	51.2	38.2	3.4	—
Satakunta	80.4	3.1	73.1	47.9	5.7	0.2
Tavastland	80.9	2.5	37.2	50.9	9.2	0.2
Nyland	80.5	5.6	39.9	46.3	8.2	—
S. Österbotton	80.0	4.2	48.3	41.0	6.4	0.2
Savolax	81.3	2.1	33.2	52.9	11.0	0.8
Karelen	82.2	1.4	23.9	55.7	17.8	1.2
N. Österbotton	82.6	1.7	21.7	52.5	21.8	2.5

As is seen the Swedes in the country, have on an average, a lower index than the Finns. The relatively highest number of dolichocephalic types are to be met with in Åland and the south-west archipelago, in correspondence with their Swedish extraction. The Swedes in Nyland present nearly the same conditions, while dolichocephalic and brachycephalic types appear, in southern Österbotton, in about the same numbers. — Within the Finnish population again, the West-Finns (in Finland proper, Satakunta and South Österbotton) are those, who stand nearest to the Swedes. In several districts dolichocephalic types are dominant. The Tavastians who form the majority of the population in the country, and who inhabit not only Tavastland but also parts of Nyland and southern Österbotton, as well as smaller stretches of Satakunta and Savolax, show a larger percentage of brachycephalic types and have an average index of 80—81. The Karelians, who

live in the eastern part of the country have still shorter heads with an average index exceeding 82. Among the Finnish race-groups in Finland the Kävnerians show the most brachycephalic types, their average index is considerably over 82, and among them can be met, numerous individuals, whose index exceeds 85.

Lastly we give here the numbers respecting the colour characteristics according to Westerlund. (Relative numbers.)

SWEDES.

Province	Colour of the eyes				Colour of the hair				
	blue	grey	mixed	brown	light	cendré	brown	black	red
Åland and Finland proper	53.92	31.32	9.03	5.72	19.28	34.34	41.57	4.51	0.30
Nyland	48.51	31.71	11.92	7.86	20.05	36.31	36.59	6.50	0.54
S. Österbotton	53.65	28.63	10.45	7.17	15 00	31.82	38.64	12.73	1.82

FINNS.

Province	Colour of the eyes				Colour of the hair				
	blue	grey	mixed	brown	light	cendré	brown	black	red
Finland proper	45.63	37.47	11.20	5.72	15.48	49.89	30.35	3.67	0.61
Satakunta	45.51	35.25	10.43	8.71	18.53	42.63	33.26	3.96	1.62
Tavastland	46.63	33.83	11.86	7.68	18.87	38.14	36.39	5.66	0.94
Nyland	46.18	33.67	14.25	5.90	19.90	42.26	30.96	4.67	2.21
S. Österbotton	52.98	28.52	11 95	6.55	19.27	32.18	58.73	9.25	0.57
Savolax	42.11	34 14	18.20	5.55	18.78	30.26	39.26	2.56	0.14
Karelen	40.34	32.82	18.89	7.95	15.62	34.10	45.60	3.83	0.85
N. Österbotton	42.17	29.63	19.09	9.11	13.32	41.06	35.63	9.21	0.78

As can be seen from the tables, the two races of people living in Finland differ regarding the colour of the eyes and hair to a very small degree from each other. Among the Swedes we find blue eyes in about 52 %, and grey eyes in about 30 %, or light eyes therefore in more than 80 %. Among the Finns we meet identically the same percentage: blue eyes in about 45 %, grey eyes in about 33 %, together therefore light eyes in 78 %. The least number of brown eyes among the Swedes we find among the inhabitants of Åland and Finland proper, among the Finns the least number is found among the inhabitants of Finland proper and Nyland, where the mixture with the Germanic element has been greatest. The greatest percentage of brown eyes is found with the Kävnerians in North Österbotton but even among these it is less than 10 %. The colour of the hair shows a similiar correspondence: in the Swedes there are 18.5 per cent having light hair, and 34.5 % with cendré hair, or taken together 53 % with fair hair, in the Finns there are 17 % with light hair and 40 % with cendré hair, or taken together 57 % having fair hair.

As can be seen from the information presented above, the Swedes in Finland show rather decidedly the anthropological characteristics which are considered typical for the Nordic (or Germanic) race: tall stature, predominating Dolichocephali together with light eyes and fair hair. The Finns on the contrary are shorter, and the predominating number are of the brachycephalic type, but in common with Swedes they have mostly light eyes and fair hair. These last named characteristics are very interesting. They indicate decidedly that the Finnish race-groups cannot be considered anthropologically to belong to the Mongol race, as one earlier tried to assert.

Meanwhile it is yet too early to definitely establish the position of the Finns systematically. This chiefly depends upon the fact that at the present time we have not been able to collect sufficient material in Finland. It may be especially emphasized, that careful cranio-metrical examinations are yet lacking, and that the material we now possess, concerns almost exclusively male individuals, and within a highly limited age too. (Age for military exercise.)

PROFESSOR VILHELM HULTKRANTZ.
Anatomist, Anthropologist, Eugenist, Uppsala.
* 11/2 1862.

PROFESSOR IVAR BROMAN.
Anatomist, Cytologist, Lund.
* 18/9 1868.

PROFESSOR TORSTEN THUNBERG.
Physiologist, Lund.
* 30/6 1873.

PROFESSOR OSSIAN SCHAUMAN.
Physician, Eugenist, Helsingfors.
* 10/3 1862.

EUGENIC WORK IN SWEDISH FINLAND

BY

OSSIAN SCHAUMAN, M. D.

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POLITICALLY FINLAND WAS UNITED TO SWEDEN UP TO 1809; it was then conquered by Russia and became an independent republic in 1918 after a bloody struggle. Laws, administration, education, in other words, culture in general are chiefly of Swedish origin.

Finland is inhabited by two different races, the Finnish and the Swedish. The population of Swedish origin amounts at present to 370,000 souls, thus constituting only 11.5 % of the whole population. About 10 % of the Swedes are spread in small colonies among the Finnish population, while 90 % inhabit certain stretches of land along the coast and a great part of the archipelago. These lastnamed districts do not form one connected whole, but consist of three separate territories Nyland, Åboland with the Åland Islands, and Ostrobothnia. The whole area of the Swedish settlements amounts to 15,000 square kilometres or to 4.5 % of the whole surface of Finland.

Map showing the domiciliation of Swedes in Finland at present.

At present about one third of the Swedish against one eighth of the Finnish population lives in the towns. The country population in Swedish Finland mainly occupy themselves with farming; the population of the islands and along the coast are also fishermen and sailors. In Ostrobothnia the greatest part of the land is in the hands of the peasantry. In the other Swedish districts the number of peasant-owners is smaller.

The knowledge of reading is general. The number of Swe-

dish undergraduates at the University of Helsingfors — the only state University — amounts to 666 against 2,602 Finnish alumni. Moreover the Swedish academy at Åbo, just lately founded, whose Principal is Edw. Westermarck, the renowned Professor of sociology, counts about 140 alumni.

I beg here specially to point out, that Swedish culture is of a considerably earlier date than Finnish. It is only 50 to 60 years ago since government officials were mostly recruited from the ranks of the Swedish population. Lately, thanks to intense Finnish propaganda an ever increasing number of Finnish schools have been founded and the Finnish educated classes are steadily increasing in number.

The boundaries between the two spheres of language have undergone changes partly in favour of the Finns, partly in favour of the Swedes. During the last few decades a remarkable immigration of Finns has taken place into the Swedish towns and also in some places on the country-side. Above all industrial enterprise has attracted the Finns. However, lack of hands for farming purposes in consequence of immigration to the towns and emigration to foreign lands (chiefly America) have given Finnish workmen employment in Swedish districts. Part of these immigrants have remained in their new abodes on the Swedish land and many have bought large or small farms.*

At first this immigration aroused little attention but with the growing consciousness of nationality, now manifest amongst the Swedish population, the view is more and more gaining ground that measures must be taken to ensure that Swedish land should remain in Swedish hands.

The Swedish population wants to ensure its future also through measures of another kind. They desire to be regarded as a part of the population of Finland on an equality with the Finnish majority both as to administration and cultural rights. Indeed, a protection of the minority is demanded and legal measures are claimed, for the sake of procuring self-government within certain bounds to the Swedish minority.

Hitherto however, these requirements have met with serious resistance from the Finnish side. Even if they were granted, it is clear to the Swedish population, that laws cannot offer the Swedish an unfailing protection against pressure from the Finnish majority, unless the Swedish themselves possess the *will* to live and are ready to make sacrifices in order to create an innate power, which under all circumstances constitutes the most unfailing defence of a people. Through considerations of this kind it became evident, that it was indispensable to take measures towards ameliorating the standard of health among the people in Swedish Finland.

A circumstance which helped to a great extent to hasten the realisation of this plan may be shortly mentioned here.

In 1911 Miss Jenny Florin made a donation of Fmk. 100,000: — to the Swedish Literary Society in Finland, on condition that the interest of the fund should be used to promote medical science. This was outside the proper sphere of work of the Society, of which fact the donatrix was aware. However, knowing that

* The facts stated above are mostly taken out of the work: »La Nationalité Suedoise de la Finlande par G. Nikander et E. von Born. Helsingfors 1920.

at this time there did not exist in Finland, any other society of which the statutes guaranteed the future use of her donation for Swedish cultural work, she offered the aforesaid sum to the Literary Society. The Society received the donation and, on the proposal of a committee, specially appointed for the purpose, they decided that the interest should be used *for comprehensive scientific examination of the mental and physical health of the Swedish population in Finland and of all circumstances, which might exercise influence on it. It was particularly pointed out that the significance of heredity for the health of the people should be made a special object of research.*

The Literary Society entrusted this research to a special committee, consisting of eight persons and called »The Florin Commission» (Florinska Kommissionen). Though the economic resources at the disposal of the commission were small, the work was immediately begun. Through bursars, nominated for the purpose, the population in three parishes of Swedish Finland were examined in conformity with forms drawn up by the commission. About 23,000 persons underwent an examination, chiefly with the view to stating the occurrence of nervous and mental diseases as well as tuberculosis; at the same time the anthropological circumstances were studied as well as the housing and nourishing questions. As yet only the results of such examinations as had to do with the nourishing of the people have been published,* but other results will of course be brought to the knowledge of the public in due time.

The Great War which, owing to Finland being politically united to Russia, also affected Finland, checked the work of the Florin Commission. During the time of war the only possible work was the compiling of material for a statistical research about the frequency of marriage, nativity and mortality and also of some other statistical primary facts in connection with the Swedish population of Finland. The work, conducted by the able statistician of the Commission, Professor E. Lindelöf, will soon be concluded and is sure to form a correct basis for future examinations and measures.

When Finland had separated from Russia and became an independent state, the work of the Commission got a fresh impetus. In different quarters people's eyes had been opened to the necessity of *purely practical* measures for the amelioration of the health of the population in Swedish Finland and for this purpose a number of donations in money were placed at the disposal of the Commission.

The interest on one of these funds of Fmk. 200,000: — the Commission decided to use for awarding prizes to mothers. The conditions, according to which a mother has a chance of being awarded a prize, are, that she and her husband must belong to healthy families, be in good health themselves and possess at least four strong healthy and well nurtured children of the age of four to fourteen years. The prizes either consist in a diploma, or a diploma and a sum of money, hitherto stipulated to amount to Fmk. 500: —. The first awarding of prizes took place last year and aroused greater interest than could be expected.

The income from another donation amounting to Fmk. 750,000: — is to be used to afford general eugenic information.

* Carl Tigerstedt, Ueber die Nahrungszufuhr des Menschen in ihrer Abhängigkeit von Alter, Geschlecht und Beruf. Helsingfors 1915. 232 p.

For this purpose the Commission issues a series of pamphlets. Hitherto the following subjects have been treated of: the importance of heredity for the health of the people, the care of children and home education. In preparation are pamphlets about temperance, thrift and the desertion of the countryside. The pamphlets are spread by 180 cultural societies, situated in the Swedish districts, and have been issued in 30,000 copies. They ought to reach most of the Swedish homes in Finland.

As it is beyond doubt that the written word in many cases is of less effect than the spoken, persons specially trained for the purpose will, as far as the means of the Commission allow, be employed to carry on the propaganda. They are to spread knowledge through lectures and above all through personal instruction in the homes. For the said purpose persons interested in the work and not paid for it will act as assistants. They are chiefly recruited from a woman's association under the name of the »Martha society», working in every part of the country for twenty years, which has made it their object to spread knowledge in every home. The society is well organized and has specially gone in for teaching the housewives how to take care of their homes; it has with the greatest success spread the knowledge of cooking, women's handiwork and gardening. The care of children is also part of their programme and it co-operates with the Commission in the above mentioned awarding of prizes to mothers.

This information work, carried on by the above mentioned paid and unpaid workers, will comprise the introduction of rational care of children, a campaign against tuberculosis, temperance work, shortly family hygiene in the most extensive meaning of the word.

As soon as the Commission had laid out the plan of work, pointed out above, it became evident to the members that a reconstruction of the Commission into an independent society must be undertaken. A proposal to this effect was handed in to the board of the Literary Society, whose approval was gained. The board promised to hand over most of the funds, the interest of which the society had a right to dispose of, to a new society, to be organized for this purpose.

In March this year the newly formed society held their constituent meeting and took the name of *»Samfundet Folkhälsan i Svenska Finland» (Society for improving public health in Swedish Finland).*

The society will in all essential points follow the principles laid down by the Florin Commission. It consists of working and supporting members. The working members are divided into two sections: one scientific and one practical. More than half of the members of the sections belong to the Helsingfors University teachers' staff.

At present the working members are the following: Amos Anderson (business man), Robert Ehrström (professor of medicine), Harry Federley (lecturer on genetics, *sercetary to the Society),* Jarl Hagelstam (professor of neurology, *vice president of the Society),* Oskar von Hellens (professor of hygiene), C. M. Hohenthal (medical practitioner, *archivist to the society),* Fanny Hult (president of the central board of the Martha Society), G. Landtman (lecturer on sociology), Albert Lilius (professor of pedagogics), Ernst Lindelöf (professor of mathematics), Wilhelm Pipping (professor of pediatrics), Henrik Ramsay (doctor of philosophy,

managing director of The Finland Steamship Company, *treasurer to the Society)*, Emma Saltzman (member of the central board of the Martha Society), Ossian Schauman (professor of medicine, *president of the Society)*, Robert Tigerstedt (professor of physiology), Wilhelm Udd (master builder) and Axel Wallgren (professor of general pathology and pathological anatomy).

Sub-committees of the Society are already founded both in Åboland and in Ostrobothnia and branches are being founded in several parishes.

It is highly desirable for the Society as soon as possible to found a special institute for research in heredity. A fund of Fmk. 50,000:— exists already and just lately a sum of Fmk. 300,000:— has been bequeathed to them for the same purpose. However very little can be done with the interest on these funds. It is to be hoped that some patrons of science will give their aid towards the realization of this extremely important work, the more so as the Society in the person of its secretary, Dr. Harry Federley has a scientist, who possesses the necessary ability for undertaking the management of such an institute.

Professor Jarl Hagelstam.
Neurologist, Eugenist, Helsingfors.
* 28/3 1860.

Among the first tasks of the scientific section of the Society may be pointed out an account of the national character in Swedish Finland, and further an anthropological research of the Swedish population, on the same plan as the one that will be followed in a proposed corresponding examination in Sweden, Norway and Denmark.

As regards the practical hygienic work of the Society it is worth mentioning that temperance work must in the nearest future be made an object of special attention. The reason is: since total prohibition was introduced two years ago in Finland drinking has increased in a most alarming way in certain parts of the country, especially in the coast regions of South Finland, where the population is of Swedish origin. Through smuggling of spirits from the neighbouring Esthonia the people earn large sums. They leave their honest callings, farming and fishing and become addicted to an immoderate desire for intoxicating drinks. The government has granted pecuniary subsidies to the Society for the campaign against intemperance and thus made it possible to carry on the said propaganda with greater intensity than could otherwise be done. A happy circumstance is that our renowned physiologist, professor R. Tigerstedt, has undertaken to conduct this work.

Immediately after the constituent meeting the Society issued a proclamation to the Swedish population of Finland, in the shape of an artistically illuminated »table», printed on cardboard, which is to be sent out in about 60,000 copies. It contains a number of commandments about the hygiene of the people, which run as follows:

SWEDISH MEN AND WOMEN!

On our own will, on our innate power ultimately depends the future of the Swedish race in our country. A people mentally and physically strong can hold out even under hard outward pressure!

Improvement in the health of the people must therefore be our watchword, and first of all we must direct our attention to the children! That they are born with a good disposition, that they are taken care of and educated well, there is the surest ground for our happiness in the future!

The inherited qualities of the parents, both the good and the bad, are reflected in the children. Be careful therefore when you marry that your chosen one has good health and belongs to a healthy family!

Be on your guard against strong drink and sexual disease! They not only undermine your own health. They can even do harm to your children and their posterity. Do not forget that the sins of the fathers are visited upon the children unto the third and fourth generation!

Be modest and thrifty! But still not a slave to the desire for money! It can so easily lead you astray, and what shall it profit you to gain the whole world if you lose your own soul the while! The best inheritance you can give your children is not money and gold but a sound mind in a sound body!

Should you be the owner of a piece of ground do not sell it, however tempting the offers may be! Rather make it your glory and your pride as your fathers before you to leave it in an improved state to your descendants! Remember also that a farmer's work is the most important and the healthiest among all occupations!

And even if you have no land of your own, but have lived and grown up in the country since your birth, do not abandon your native place unless circumstances really force you to do so! Above all, do not move into town! There temptations and dangers threaten you, which may be the cause of your own and your children's ruin!

Take care of the children from their birth onward tenderly and lovingly Educate them to be obedient, to love truth and to keep their word! Harden their will and accustom them early to do useful work, adapted to their strength and ability! Diligence promotes health and welfare and keeps you from many occasions for sinning!

Briefly: all members of our Swedish race should be educated to become honest and diligent workers for their native place and their fatherland!

There must be no bad Swedish men and women in this country!

Let us all obey these admonitions and keenly feel our responsibility before coming generations! If we do so it will be well with us and the day of our Swedish race shall be long in the land!

THE SWEDISH CHURCH REGISTERS AND THE DEMOGRAPHICAL SCIENCE

BY

Docent K. ARVID EDIN

UPPSALA

THE OFFICIAL SWEDISH DEMOGRAPHICAL STATISTICS, IN contrast to those of most other countries, exhibit the peculiarity that they rest, all the way through, on a continuous, as far as possible, closed ecclesiastical record-keeping, comprised in the so-called *parish registers (församlings-böckerna*, in older times catechetical meetings registers), where, with complete names, with exact dates — registered at the same time in the birth-, marriage-, death-, and removal registers — one can follow every person's demographical fate, as long as he lived in the parish: birth or entrance into the parish, with information on the parish of birth and that of removal, civil status, and eventually year and date of marriage, entrance into or withdrawal from marriage, the birth or death of children (removal from or entrance into the parish), removal, with the name of the parish, or death. The church registers also, of course, contain information respecting occupation; their value here, however, stands far behind what it does from a pure demographical point of view; the parish registers also contain information respecting defects, race (for example Lapp), religion, and nationality, and eventually sentence of punishment.

The recurrent censuses of the people rest upon the returns given in the parish registers for the 31st of December in all years ending with 0, the last being thus 1920. Especially respecting their completeness and their exactness concerning age, they may probably by considered unique. By means of more rigorous regulations as to the taking out and issue of certificates for removal — high fines for neglecting to report removal within a short time of respite, measures to ensure that entrance into one parish shall be brought to coincide as far as possible with removal from another parish — and by arranging that the non-existence of persons, about whom it has not been possible for a long time — since 1894 during three consecutive assessments (»mantalsskrivningar») — to obtain any information as to their actual presence in a parish from which they have not taken out a certificate for removal, shall be notified in the registers (the parish registers and the registers of non-existence), the closed keeping of the parish registers has during the last generation been brought to the highest possible perfection. Special certainty has been gained that persons cannot — as not seldom happens in Finland, where the keeping of the parish registers has been neglected and not as in Sweden altered to suit the needs of the time — during any longer period of time live only a statistical life. The assessment is the Swedish equivalent to the »momentary, real (actual) census» (on oral statements) taken in foreign countries; the parish registers must be corrected and completed yearly in connection with the assessment. It

can most nearly be described as self-enumeration (the filling in of formulas by the heads of households, without questioning by enumerators). *The Swedish census can suitably be described as a »paper-census» (balance sheet) built upon the current book-keeping over all the ingoing and outgoing items of the population, controlled by an element of »momentary, real census».* In Stockholm the parish register is missing and the deficiency is made up for entirely by the assessment lists.

Ever since 1860 the material for the census is nominative, i. e., the clergy have ever since that time sent copies every tenth year of the person lists of the parish registers to the Central Bureau of Statistics, giving the complete names of all those who were found in the parish on the last day of the year, with information as to sex, civil status — since 1870 — year and place of birth, race, nationality, religion, defects, occupations, position in family (wife, son, etc.) — as far as possibly persons are arranged in families and households — in 1920 also the years of marriage and widowhood; by means of which arrangement the widest possibilities are opened, not only for different combinations in working up the facts, but above all for watching over the correctness of the information given by the census papers. Moreover, in connection with the census the Central Bureau of Statistics sends out to the clergy a large number of inquiries concerning deficiencies and supposed errors in their returns, though the clergy possess in a much higher degree than the census officials of other lands, the qualifications needed to bring about a perfectly satisfactory census material.

From 1860 there is also sent in from the registers of births, deaths, and marriages, yearly copies containing information respecting not only the name, date of birth, marriage, and death of the persons in question, but also the names of the parents of the new-born, with their occupation, date of birth, and, from 1911, also the date of marriage; respecting the date of birth of both parties to a marriage contract, with their occupations, and the marriage number; respecting the cause of death (both the clergyman's and medical man's notes, with information concerning the medical man from whom advice was last sought on behalf of the deceased), and also the dead person's date of birth, and civil status, and (since 1911) the date of birth of the survivor. For the whole time between 1861 and 1910, it has only been obligatory for the towns to send in information respecting the cause of death, but since 1911 it has been so for the whole country. Unfortunately the tables respecting the cause of death are published without sufficient division, from 20 years of age only in groups of ten years, without combination with either civil status or occupation. The former combination cannot be made even with the help of the manuscript tables, for example regarding such a common illness as tuberculosis. Nominative returns are also sent yearly to the Central Bureau respecting immigrants and emigrants, with the date of birth, civil status, and occupation, and information on the country from which the migration took place and the immigrants' nationality or the country to which the migration shall take place.

The peculiarity of the Swedish demographical statistics affords many advantages besides those already indicated. Very exact information concerning the numbers of the people can be obtained yearly without any additional cost to the state or the parish, from every parish, according to sex, and with returns not only of the number of births, marriages, and deaths, but also of the number of those

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* 12/2 1873.

who have entered the parish, and those who have removed from it (either inland or from or to foreign countries), likewise divided according to sex, which last information, in any case as regards the inland removals and as completely as in Sweden, can only be obtained in one or two other countries. As the vital statistics and the population statistics are built upon precisely the same material, and with the use of the same clearly understood conception of the population, »the legally registered population», it is much easier with the Swedish than with the foreign method, »the de facto (actual) population», to obtain real local geographical coefficients, for example, of the births, deaths, and marriages in the larger towns, in contrast to those of the country-side surrounding them. If the sick from the country in large and increasing numbers are taken into the hospitals in the towns, the towns will clearly, if one reckons with the de facto population, feel the burden of a mortality that is to a certain extent artificial, especially noticeable probably in the case of certain ages during youth. If the women from the country in increasing numbers are confined in the maternity hospitals, the frequency of birth is raised thereby; if more and more of the country brides are married in the towns the frequency of marriage rises higher to a corresponding degree, at the cost of the country-side, as long as one reckons with the de facto population and not, as in Sweden, with the legal. It is only in regard to certain diseases, such especially as tuberculosis, which are comparatively slow in causing death, that the Swedish demographical method does not perhaps give an entirely correct expression of the local geographical influences. Such diseases to a certain degree work in the direction of causing removals (and that not only by chance either). Younger unmarried persons of country extraction, who have sought work in towns often move back again to their own district after they have been attacked by such illnesses, and die there; this probably is more especially so in the case of women, who usually do not make such long migrations as men do. In such cases it is difficult to know which »environment» ought justly to be charged with the death. It is not impossible that persons of weak constitution, in whom is found a disposition towards tuberculosis may not be already disposed, more than others on account of this, to prefer work in the towns rather than in the country. An addition to the returns respecting deaths in the form of information on removals which have taken place during, for example, the last three years, would be very desirable for throwing light on this important question. On the whole the statistics over removals seem to be — for reasons easy to understand — the most neglected area of demography. Doubtless the Swedish parish registers (and removal registers) have much to offer that is new and of great interest for investigators, among other things in the area of the statistics of fecundity. In exceptional cases, for instance with regard to accidents occurring during casual visits to the town, it may happen that the Swedish method affords even a less satisfactory result than the usual one. It may be observed, however, that deaths, births, and marriages are noted in the district where they occur even if they are not reckoned there.

For the whole country the Swedish method allows a particularly reliable estimation of the population's division according to sex, civil status, and age, in the last respect into groups of one year, as the foundation for birth, death, and marriage coefficients specified in a corresponding degree.

The weakest point in the Swedish census is, as already indicated, the information respecting occupation. With the present highly developed and very changeable specialization of work within all occupations, it is only by means of detailed information supplied by those concerned, in oral conference with an »enumerator», that we can obtain a deeper insight into the life of trade, as in any case was tried in Germany, The indispensable condition for this is a »momentary, real census». Here a continuous registration of the changes of the population is plainly not at all sufficient.

In any case one cannot demand that the clergy, whose chief call lies in quite another sphere of work, should be enjoined to obtain correct details concerning the occupation of all the inhabitants in their parishes. At the census in 1910 an attempt was made with the help of the assessments to obtain a somewhat better material as to occupation than at the previous censuses. In 1910 one also for the first time worked up the material respecting occupations according to age. An attempt to arrive at the mortality in different occupations, in different groups of ages, as is done in England, has not led to any trustworthy result.

Taken as a whole the Swedish census, arranged as it is now, could not be extended considerably. Thus, for example, returns touching the whole number of children born in every existing marriage can not be demanded, as they would not be founded upon current registration. A real census giving all such information, besides concerning occupations and income, etc., is therefore required and should be afterwards completed by compulsory introduction of family-registers, as is the case in Württemberg, i e. the registration of every marriage should be accompanied by a family bulletin where all the demographical events in the family should be registered with the same certificate as in the parish registers, and when the family removes from one parish to another, this bulletin should be transferred as well. Whereas now — if one is not willing to burden oneself with a practically insurmountably difficult work — one can only follow a family during the time its different members live in the respective parishes, one could by such a means follow it exactly in detail, even from the time when it was founded. And not least would the removal registers, an institution peculiar to Sweden, here be of the greatest value.

The keeping of the Swedish parish registers still rests in principle on the instructions given in the Ecclesiastical Law of 1686. Since that time, in any case, the keeping of birth, marriage, and death registers seems to have been regularly practised over the whole kingdom, though in many varying forms. Before that time such a continuous registration was considered a private matter for the clergyman or in any case an affair that fell upon the bishops and cathedral chapters to undertake, if they wanted. One of the earliest of such ordinances was issued in 1608 for the archiepiscopal diocese of Uppsala. Its observance does not seem to have been worth mentioning. But in the diocese of Västerås, on the contrary, after a similar ordinance had been issued in 1622 by the renowned JOHANNES RUDBECKIUS, the keeping of the parish registers was pursued, according to a form which the bishop had printed and provided. Ever since that time the death registers in that diocese have offered very much of demographical interest, (first and foremost the information respecting the cause of death, by which means epidemic diseases can be traced fairly accurately). In any case since the end of

the seventeenth century the death register's information swells out to really demographical biographies, containing information respecting years of marriage and widowhood, the numbers of children in different marriages, etc., of inestimable value for the statistical studies of families of those times.

It is true that in the Ecclesiastical Law of 1686 parish and removal registers are presupposed, but as a foundation for the census, containing information respecting years of birth and age, they have certainly only appeared sporadically until far into the eighteenth century, and then chiefly in connection with the establishment of the Table Archives (Tabellverket).

In 1749 the Swedish *Table Archives* were established, and since that time, earlier than any other country, Sweden possesses continuous, never broken official demographical statistics, based on a foundation of amply specified printed formulas, which were to be filled in by the help of the parish registers. The most remarkable innovation was the census table, with division of men and women into groups of 5 years (during the five youngest years of life into 3 groups) — a division perfectly identical with the one used in the mortality tables, and there in combination with a large number of causes of death. Down to 1775 the table was given in every 3 years and from that time to 1855 every 5 years. These censuses can be characterized as the oldest in the world, in a modern sense. As long as regular keeping of the parish registers was still lacking, they could most nearly be characterized as living censuses, having as foundation the oral information given by the heads of the households, and consequently suffering from all the imperfections such a census shows. The imperfections of the first censuses — especially false information as to age in order to escape the capitation tax, which was not paid by the oldest and youngest — has been vigorously emphasized by Per Wargentin, whose name before everyone's is bound up with the Table Archives. The effecting of a regular keeping of the parish registers, homogeneous for the whole kingdom, was considered by Wargentin as the only possible foundation for a fully reliable census. Such an arrangement was taken at any rate in the diocese of Västerås, where parish registers of nearly identical appearance to the modern ones, and with printed formulas, were begun in and have been kept from 1774. Ever since that time up to the present, according to the degree in which the keeping of the parish registers was closed, i. e. the data respecting removal were properly recorded, one has complete uniformity in the demographical material. On the foundation of these early parish registers, with the help and control afforded by the death register's biographies, it is relatively easy to effect series of family statistics, in which the children can be followed in any case till the customary age of removal. The writer of this article has succeeded in effecting for some parishes, even from the end of the 17th century, such continuous, fully representative series of family statistics, with full information respecting the dates of birth of all the children and of the deaths of all those deceased under 15 years of age. Especially for the study of the secular changes of the frequency of re-marriage, and of the marriage-fecundity, as well as of the mortality, male and female, among married and children at different ages (especially in regard to severe epidemics, and more important popular diseases, and in regard to the connection between child mortality and the intervals between child-birth) such investigations are without doubt

of great interest, so much the more so as the Table Archives in these points do not give sufficient guidance. The combination of civil status with age and sex was first introduced into the Swedish census of 1870. Gustav Sundbärg's brilliant attempt to effect such a hypothetical combination for the time between 1750 and 1780 can naturally never be anything more than a hypothesis. His assumption that marriage-fecundity during the whole of this time underwent only casual variations and no secular evolution, seems to me — on account of the certainly as indicated above, much too insufficiently worked up material from the diocese of Västerås — to be somewhat doubtful. But on the other hand Sundbärg is certainly right in his assertion that there are errors in the tables respecting division of age and sex of the population, especially for the earlier ages.

After the *Provincial Archives* were established at the beginning of this century, the possibility of studying the parish registers has been very much facilitated.

GENETICS IN SWEDEN

BY

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THE SWEDISH SCHOOL OF EXPERIMENTAL GENETICS MADE its start before the rediscovery of the Mendelian law. A pre-Mendelian geneticist, PEHR BOLIN, at that time assistant at the plant breeding institute in Svalöv, published in 1897 a paper dealing with artificial crosses between different varieties of barley in »Utsädesföreningens Tidskrift». He arrived at the conclusion that no variation takes place in the first generation, while it does occur in the second. This variation seems to follow definite laws, he says, as the resulting varieties represent different combinations of parent characters. He has also found that the variation in certain cases falls beyond the limits of the variation of the parent plants. He knew the fact of combination, as did many of the pre-Mendelian workers, but he did not push his knowledge to the point of exact numerical relations. The value of BOLIN's discovery does not seem to have been appreciated at that time, and his name has not been mentioned in the foreign literature among the pre-Mendelian workers, so fas as I know. This is explained by the circumstance that his paper is written in Swedish and published in a journal of applied science.

The first who made Mendel's discovery known in Sweden was the talented plant physiologist in Lund, BENGT LIDFORSS. He had been much interested in the mutation theory of HUGO DE VRIES, and he acquainted himself with Mendel's discovery in that work. Mendel's discovery was considered as mainly a verification of the mutation theory at that time, as it demonstrated in a clear way the discontinuity and the constancy of the characters. He gave a masterly summary of Mendel's discovery in a popular work published 1904. He had already at this time investigations under way dealing with the problem of the origin of species in the genus *Rubus*. He found that species originated through mutation as well as through hybridization. Some species, as *R. polyanthemus*, gave rise to a great number of morphologically different types when selfed, which formed an absolute parallel to the mutations of DE VRIES in many cases. A still greater variation, however, was obtained from the hybridization experiments. The hybrid *caesius* × *Wahlbergii*, for instance, gave so great a variation in the second generation that he was able to distinguish types among the descendants which resembled nine species already described. There were additional types which did not resemble any known species. These striking results led him to adopt the Mendelian point of views more and more. He dismisses at last the mutation theory entirely and holds the view that the seemingly spontaneous, wild forms represent the last oscillations of a segregation. His discovery that in certain cases of successful species crossing all the descendants resemble the female parent plant is very interesting. The pollination stimulates the development of the ovules, according to the explanation given by LIDFORSS, but does not bring about any nuclear fusions.

Difficulties in obtaining suitable experimental ground hampered and limited the work of Lidforss. He succeded at last to arrange the matter but died after short time, working to the last minute.

Lidforss represents the searcher, the problem raiser in the history of Swedish genetics; he is not in the same degree the solver of problems but his logical intelligence, his enthusiasm and great learning gave a mighty impetus to the study of genetics in Sweden.

Dr. Hans Tedin.

While Lidforss spent his time at the University of Lund struggling against practical experimental difficulties one of the most important genetical analysis hitherto made was going on at the plant breeding institute in Svalöv. Nobody knew anything about this work before it was done and published. It was H. Nilsson-Ehle who in 1908—1909 presented the results of his investigations of polymeric factors in wheat and oats. An analysis of weight had now been worked out in Sweden. The great importance of this analysis with regard to the interpretation of quantitative variation, acclimatization, and other questions was at once realized. The cogency of his analysis showed the potentiality of the young Mendelian science, and, therefore, stimulated and spurred the study of genetics among Swedish scientists. It also showed that the intensive study of genetics required special and good experimental working conditions. These are mainly of two kinds, sufficient ground and sufficient assistance, and such requirements are better fulfilled at the plant breeding institutes than at the universities. Most of the Swedish geneticists are therefore engaged at the plant breeding stations. The material experimented upon is also mainly cultivated plants.

The valuable contribution to genetics made by Nilsson-Ehle through his analysis of polymery in 1909 was renewed a few years after when his extensive work on the inheritance of quantitative characters appeared. This work rests upon the polymery analysis and represents a further building up of the theory. Since then the mutation phenomenon has mainly occupied his interest. He has investigated expecially three groups of mutants, viz. chlorophyll variants in barley, and fatuoid variants in oats and speltoid ones in wheats. His work on the speltoid mutants in wheat, where segregations is strongly disturbed by many complications (coupling, elimination of gametes, partial heterogamy), is especially rich in fresh suggestions and new ideas. Another study dealing with the resistance of barley towards the attacks of the nematode *Heterodera Schachti* is important also from a practical point of view; the character shows monohybrid segregation, which is a rare case of segregation among resistance-characters.

A genetical study started already in pre-Mendelian time, or about 1890, has been made by Hans Tedin in Svalöv dealing with peas, Mendel's classical experi-

mental plant. He has been able to show, thanks to the discovery of a new color variety (light purple), that the ordinary flower color in *Pisum arvense*, held to be a simple character and an allelomorph to white by MENDEL, depends on three complementary factors. TEDIN may serve as a type of the strict analyst, who works with extensive progenies and numerous controls, tying the chain of proof methodically and definitively.

The versatile mind of BIRGER KAJANUS, another Swedish geneticist, contrasts greatly with the persistent disposition characteristic of TEDIN. His temperament marks both his material and his theoretical point of views. He has published a great number of papers dealing with widely different genera and characters. He has collected his thoughts on greater problems in two cases, viz. with regard to the inheritance of the color and the shape in roots *(Beta* and *Brassica)*, and with regard to the flower color and other characters in *Papaver Somniferum*. His theoretical point of views, as seen in his publications dealing with *Beta* and *Brassica*, pass from enthusiastic Mendelism to Lamarckism and scepticism, and back to practical Mendelism. His work on *Papaver* is a pure analytical work. His extensive and long continued experiments with crosses between different wheat species seem to be of great interest both analytically and phylogenetically, to judge from preliminary notes already published.

HANS RASMUSON has combined analytical investigations with the species problem. He was engaged as vine breeder in Germany for some years and worked expecially with the problem to raise vines which combined the fine quality of the European varieties with the resistance of the American varieties towards the vine-disease *(Phylloxera)*. The war put a check to these investigations, but it was found that immunity is dominant, and that in some cases monohybrid segregation, in other cases more complicated segregation, takes place. The characters of different species as well as of different varieties of *Vitis* seemed to segregate in Mendelian ratios. The same has been found by RASMUSON to take place in the genus *Godetia*, where the both species *Whitneyi* and *amoena* have been found to segregate with regard to morphological characters. A close analysis of the flower colors of these species has also been made. These investigations give the interesting result that the genus *Godetia*, although belonging to the same family as *Oenothera*, does not show any of the complications of segregation characteristic of the latter genus.

In addition several smaller papers and analyses have been published by RASMUSON dealing with *Impatiens Balsamina, Petunia, Papaver, Tropaeolum, Malope, Clarkia* and *Collinsia*.

CARL HALLQVIST has published an investigation of the flower color and seed color in *Lupinus angustifolius*, which with regard to both analytical distinctness and extent forms a beautiful analogue to the pea investigation by TEDIN, mentioned above. It is also valuable from a purely analytical-methodical point of view; he describes a method to determine the degree of coupling through determining the ratio in F_3 between progenies of different segregation types, which makes the result more reliable than a determination based on the segregation ratios found in the F_2-generation.

HALLQUIST has also contributed to the question of polymery, viz. in a paper dealing with the inheritance of the flesh color and the shape of the leaves in the Swedish turnip *(Brassica napus)*.

The great importance of wheat breeding in Sweden is seen from the fact that the genetic constitution of the wheats is studied by different Swedish workers. Also Åke Åkerman has studied the speltoid mutants in *Triticum vulgare*. He has found that a plant may be a sectoral or a periclinal chimaera between a normal and speltoid heterozygote. The speltoids would then be able to originate through vegetative mutation. Åkerman has also begun a study of *Epilobium* bastards.

K. B. Kristofferson has been working with *Viola* and, recently, with a bastard between white cabbage and kale. He has been able to show that Scotch kale, Brussels Sprouts, Virsing cabbage, and different varieties of decorative kales originated as novelties in the F_2-generation.

C. Hammarlund has studied the genetical constitution of different types of *Plantago major* with branched spikes and metamorphosed bracts. Several known »monstrous» types are genetically explained.

Johan Rasmuson has published the results of F_1-isolations in onions. He has found several chlorophyll variations, and polymery characterizes probably the green as well as yellow leaf color.

Ossian Dahlgren has published smaller genetical analyses dealing with *Capsella, Polemonium, Lactuca, Chelidonium, Primula,* and *Barbarea.*

The writer has been working on the genera *Oenothera* and *Salix* since 1907. The former investigation aims at clearing up the complications of the segregation which underlie the phenomenon of mutation. The latter work is an attempt to release as great a variation as possible through species crossing in order to reach an understanding of the origin of species and of evolution. The chances of combination are very great in this genus as crosses between systematically unrelated species are readily made, and because of the great fertility of the resulting bastards.

All the geneticists mentioned in the above have been working with plants. H. Funkquist alone uses zoological material. He has studied the inheritance of the muzzle color in cattle. He finds that the color is due to two polymeric factors. The light color may be due to the absence of these factors, or to the presence of an inhibiting factor. As light muzzled animals fallen from dark muzzled parents lack the complicating inhibiting factor only such animals should be crossed if a constant light muzzled breed is wanted.

Several popular works have been published by Lidforss, Robert Larsson and Kajanus dealing with the more important and interesting results of Mendelism. Mendel's own work has been translated into Swedish. A thorough text book of genetics for colleges and universities has also been published in Swedish by Nils von Hofsten.

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SOME REMARKS ON THE WORK OF THE SWEDISH GENETIC INSTITUTE IN ÅKARP

BY

H. NILSSON-EHLE

LUND

THE SWEDISH INSTITUTE OF GENETICS, FOUNDED 1917–1918 in connection with a new professorship of genetics at the University of Lund, is situated in Åkarp, near the railway station of the same name, 9 km. from Lund, between Lund and Malmö. The institute lies on ground belonging to the State farm Alnarp, only a few minutes way from the Alnarp Agricultural College. In this way the institute forms a connecting link between the university and the agricultural college, and the experiments and the cultures of the institute are easely demonstrated for students in Lund as well as in Alnarp.

The purpose of the institute is research in theoretical and applied genetics combined with lectures. Genetics has been made a special subject at the University of Lund, and courses leading to a doctor's degree in this subject are offered by the philosophical faculty under the supervision of the professor in genetics.

The research of the institute is at present limited to plants. The writer continues his former work begun in Svalöf, especially with cereals, but also experiments with several wild plants are going on. The assistant of the institute, lic. phil. G. TURESSON, has at the moment extensive work with such plants, *Atriplex* and others, under way.

The writer's work on purely theoretical genetics now embraces researches as to the mode of inheritance of a number of different genetic characters, studies on mutations, coupling and multipe allelomorphs.

Since 1913 the writer has had very extensive experiments with some characteristic mutations in wheat, called speltoid mutations by him. These mutations offer great interest in many respects, especially since their nature of complex-mutations has been almost proven; they involve, in other words, genetic changes of several Mendelian genes simultaneously. The question of multiple allelomorphs is closely connected with these complex-mutations. Furthermore, these mutations have offered great advantage in studying the question of decreased vitality of mutated pollen, of heterogamy, which is probably a form of coupling with sex-genes of the haploid generation, and of somatic segregation. The results of these researches have partly been published (Botaniska Notiser, 1917; Hereditas I, 1920, II, 1921). More than a thousand plots of plants belonging to this investigation series have now been grown in the experimental fields of the institute.

In barley a number of different chlorophyll-mutations have been found, which have been crossed with each other in order to elucidate the question whether or not the different mutated chlorophyll-genes show independent segregation or coupling. This work forms amongst plants an analogue to the American investigations in *Drosophila*-mutations. About 250,000 seed-plants of such crossings have hitherto been examined and counted.

With regard to the investigations into the mode of inheritance of genetic characters ecological characters are now especially followed up. With respect to the annual-biennial character in wheat distinct multiple or polymeric genes are met with here as in numerous other characters. Also in wild plants a number of adaptive genetic characters are studied, characters adapted to climate as well as to soil (the latter mostly studied by Mr. Turesson).

The Swedish genetic institute in Åkarp.

The study of mutations involves also the important point, whether or not the mutations may be regarded to play any rôle in evolution. For this purpose large cultures of pure lines of autogamic cereals are made in order to see if in a Mendelian factor pair, A — a, the mutative change is possible in both directions, and whether, and to which measure, reversible mutations arise. Another series of investigations concerns small mutations of quantitative characters (wheat, beans). Special attention is also paid to the question of the origin of mutations, which may be of value in the practical plant breeding.

In addition to the purely theoretical work practical plant breeding plays an important rôle at the institute. About $^2/_3$ of the ground is occupied by plant breeding plots, while the remaining $^1/_3$ belongs to the purely theoretical work. Hitherto the plant breeding embraces only cereals (winter wheat, summer wheat, barley, rye and to some little extent Indian corn).

The writer fulfils his former breeding- and combination-work begun in Svalöf with regard to wheat. In the summer-temperate, half-maritime part of Sweden the winter wheat breeding is highly favorized as compared with a continental, summer-hot climate, as but little regard has to be taken to early ripening. In the northern part of Sweden, on the contrary, the importance of winter hardiness increases with the latitude. The main point is therefore to combine through crossing high yielding-power with sufficient winter hardiness. The best high-yielding West European wheats yield, when not damaged during the winter, about 50 % more than the old winterhardy Swedish wheat. However, these wheats are in the most winters (excepting the rare very milde ones) not at all winterhardy enough and yield therefore only little. Thus through combining sufficient winter hardiness with high yielding power an increase in mean yielding-power of 50 % should be reached — a very important economic gain. As winter hardiness, yielding-power and other characters of practical interest as, for instance, straw stiffness, hereditary resistance against diseases (yellow rust and others) are characters which segregate in a very complex manner giving rise to many intermediate (or in other cases transgressive) stages, the aim is not to be gained at once, that is, through *one* cross only, followed by successive selections. A repeated and long continued

work, now about thirty years old, involving numerous crossings, combinations and selections, has been necessary. At the moment an increase in the mean yielding-power of about 40 % has been reached in South Sweden (through the raising of the new cross-variety Pansar- or Ironwheat, and others); in the more severe climate of middle Sweden about 20 % has been reached (through Thule II and others).

The writer continues his former work along this line hoping to be able to add the remaining part of the calculated increase to the present yielding-power of the wheats in South Sweden; continued crossings in large measure are therefore made and worked out (for example between Pansar and the very high yielding Dutch variety Vilhelmina, not winterhardy in Sweden). Furthermore, the breeding work aims at reaching the greatest possible straw stiffness, resistance against diseases, improved quality of grain etc. An extensive breeding work in these directions has still to be carried out in the winter wheats.

A similar extensive breeding work with summer wheat is also going on at the institute. The early ripening plays here, contrary to the winter wheats, a very important rôle. High yielding varieties of middle Europe give in Sweden, especially in cold summers, only a low yield. This is due to the fact that they ripen too late, so that the grain does not reach its definitive, ordinary size. The main point here is therefore to combine to so high a degree as possible high-yielding power and early ripening. The work already carried out in Svalöf by the writer shows that this combination is possible to a much larger degree than one would think for purely physiological reasons. A new variety has been raised, which now is grown extensively in South Sweden. This variety combines the time of ripening characteristic of the ordinary Swedish summer wheat, formerly cultivated extensively, with 12—15 % higher yielding power (as seen from the official reports on sort-trials during a series of years). If it is possible through continued crossing-work to reach an increase in the yielding-power of 30 % the growing of summer wheat in the rich soils of South Sweden, where it is now grown only on a very small scale, would undoubtedly largely increase, provided that the time of ripening remains the same. This breeding work embraces also crossings between summer wheats and the best and highest yielders among the winter wheats, a promising piece of work, although very difficult as the segregation of many characters here is very complex, and because of the appearance of numerous bad transgressions.

Crossings between winter and summer rye, with the object of improving the latter one, are also carried out and followed.

A special point of study in the plant breeding work carried out at the institute is to record new hereditary differences of value to the breeding, and to study their genetical construction. In barley, for example, the writer has discovered that certain varieties are quite immune against the attacks of the nematode *Heterodera Schachti*, while most of the other varieties, including the highest yielders, are susceptible (Hereditas I, 1920). Much work has therefore to be done in order to combine high yielding-power and other desirable qualities with immunity. This is of importance not only with regard to the barley breeding itself, but also and still more with regard to other cereals as oats and wheat, where no such hereditary differences are met with, all varieties being equally susceptible. When during the rotation of the crops immune varieties of barley are grown, which do

not increase the nematodes in the soil, the yield of other cereals, especially of oats, may be much higher than else.

In other cases the valuable hereditary differences are not easy to find out because of the fact that they manifest themselves only certain years, sometimes with long intervals. The various (and often very important) hereditary differences in wheat with regard to the susceptibility of the attacks of *Cicadula sexnotata* ear only to be seen about every fifth year (during the period 1900—1921 the years are: 1902, 1912, 1915, 1918). Another disease in wheat, which also shows considerable hereditary differences in different varieties and lines, was seen especially in the years 1907 and 1920. In other years the grains of different varieties show very differing resistance against bad weather during harvest, and so on. One of the main points of future breeding may therefore be, I think, the collection through continued and systematic crossings of all such hereditary good qualities discovered by and by, even if they separately only seldom play a practical rôle. In this manner the mean yielding of a series of years may surely be increased.

A purpose of common interest to the plant breeding is the working out of the best and simplest methods, for example, with regard to the selection in the progeny of a cross, when the segregation of quantitative characters is very complex. It is, then, necessary to have a very large F_2-generation. If the parent-varieties are rather dissimilar in characters a progeny of 20,000 plants is not much. As it for practical reasons in general is impossible to raise 20,000 plots in the F_3-generation the strongest possible selection must take place in F_2, although selection with regard to quantitative character is very difficult. The question as to the most effective method to be used in the F_2-selection now becomes of importance. In the last year the writer has selected only a very small percentage of plants (in wheat), so that in the assumed case about 200 plots would be grown in F_3. Now a more definitive selection between these plots can be made. The main point, then, is to work out the best methods for determining the yielding power in *small* plots, as it would be an altogether too large a task to determine the yielding-power of a great number of cross-descendants from many different crosses grown in sort-trials of ordinary size.

A good deal of the work of the institute, therefore, aims at stating the facts concerning the best and at the same time the most scientific methods to be used in plant breeding. The results of this work shall be published later.

With regard to teaching lectures on theoretical and applied genetics are given at the University of Lund in the winter months, November—March. In the summer the field experiments are demonstrated at different times, and the students may take part for shorter or longer time in the current scientific work of the institute. They also dispose of ground sufficient to run field-experiments of their own.

The building contains seven working rooms, intended for examination of plants and for ordinary breeding work. The material is stored in a spacious attic; there are also cellars, and a neat barn connected with the main building and intended for plant breeding work. For microscopic investigations and the like the institute maintains a laboratory in the botanical institute at the University of Lund. The institute disposes of about 3 hectares fine sandy loam-soil for the field experiments. A suitable rotation of crops is maintained. The area may be easily increased if necessary.

GENETIC CYTOLOGY IN SWEDEN

BY

Professor OTTO ROSENBERG

STOCKHOLM

THE TENDENCY OF CYTOLOGICAL INVESTIGATION WHICH aims at a connection with genetics has, in Sweden, chiefly followed two lines: on the one hand, an examination of parthenogenesis, its nature and causes; on the other, the study of bastard forms, in order, by an examination of the chromosome conditions in the germ-cells, to obtain a clearer idea of the nature of hybridizing.

As far as the first question is concerned, JUEL's important work on parthenogenesis in *Antennaria alpina* (1900) must be considered as being of fundamental importance. His discovery that, in the embryo-sac and eggformation in the case of this plant, the reduction-division is entirely absent so that, from the very beginning, the egg has the somatic chromosome number, has later on been confirmed in numerous cases; by MURBECK's investigation (1901) with respect to the polymorphic genus *Alchemilla*, and by examinations of *Taraxacum* (JUEL 1905), *Hieracium* (MURBECK 1904; ROSENBERG 1907) and of *Eupatorium* (HOLMGREN 1919).

The apomictical or parthenogenetical development in the genus *Hieracium* proved to be of special interest. OSTENFELD, by means of castration experiments, had already shown that seed-formation without fertilization occurs in most species of this genus. The present writer showed, later on, that the embryo-sac in the subgenus *Archieracium* was formed according to the *Antennaria*-scheme, while, in the case of the sub-genus *Pilosella*, a vegetative cell in the neighbourhood of the sexual embryo-sac grows out to an aposporous embryo-sac and displaces the sexual one.

Already in JUEL's *Antennaria*-work, the supposition is put forward, that parthenogenesis is connected, in one way or another, with a previously existing bastardizing process, an opinion which has, later on, been developed by ERNST into an hypothesis of bastardizing as the cause of apogamy.

HOLMGREN and the present writer also come to a similar conclusion, as the result of a cytological investigation of apomictic *Hieracium*- and *Eupatorium*-forms, where triploid chromosome numbers are specially characteristic.

In respect to the cytological investigations of bastard forms, our interest is chiefly attracted by the problem of the chromosome-conditions in the formation of germ-cells or, more definitely, in regard to the heterotypic division.

In 1904, the writer found in the genus *Drosera* a species-bastard which, in cytological respects, presented features of no slight interest; especially, because the germ-cells of the parent plants showed different chromosome-numbers the one 10 the other 20. The bastard itself showed, as was to be expected, 30 chromosomes in the somatic cells. But how does this chromosome arrangement agree with the heterotypic division? JUEL had previously shown that, in a *Syringa*-bastard during metaphasis of the heterotypic division, there took place an extremely irregular chromosome-distribution, which results in sterile germ-cells. In the case of the above-

mentioned *Drosera*-bastard, this irregularity proved to be merely apparent, as, during metaphasis, 10 regularly formed gemini appeared in the equatorial plate, while 10 unpaired or single chromosomes were distributed over the spindle-figure. Starting from MONTGOMERY's well-known hypothesis with regard to the chromosome-pairing in the heterotypic division, the above-mentioned chromosome-arrangement is thus explained: that 10 *D. rotundifolia*-chromosomes become paired with 10 *D. longifolia*, and the remaining *longifolia*-chromosomes constitute the 10 unpaired ones. The result finally is the production of germ-cells of greatly varying chromosome-numbers, as, of course, the unpaired chromosomes are distributed very irregularly on the daughter nuclei.

A large number of other cases with bastards of the type mentioned, $x + 2x$ or $2x + y$, where y signifies a smaller number of chromosomes than x, has, later on, been investigated by the writer in other species, and have proved to follow the same *Drosera*-scheme.

By MENDEL's well-known crossing-experiments with *Hieracium*-species, there was discovered the remarkable fact that bastards were constant. The experiments made, later on, by ORTENFELD showed that this depended on the occurrence of apomixis or parthenogenesis in F_1 and that the hybrids would segregate, when crossed back with the parents. On the other hand, OSTENFELD obtained, in some of his crossing-experiments, a segregation already in F_1, for instance, in a single cross between *Hieracium auricula* (sexual species) and *H. aurantiacum* 29 hybrid individuals, all of which differed from each other. The writer has shown (1917) that the germ-cells in one of the parent plants showed very different number of chromosomes, which resulted in a greatly varying chromosome-arrangement in the bastard individuals.

In the section *Archieracium* the sexual species have 9 chromosomes in the germ cells; among the apogamous species the number of chromosomes in the somatic nuclei is 27, thus proving, that these species must be considered as hybrids between parent plants with 9, resp. 18 chromosomes in the germ-cells.

An interesting fact in *Hieracum* is, that the apogamous species of *Pilosellae* are not absolutely apogamous but form both sexual embryo-sacs, which have proceeded from a reduction-division, and embryo-sacs with the diploid number of chromosomes, which have proceeded from a vegetative cell in the vicinity of the sexual one, and displacing this latter during the course of its development.

A very peculiar circumstance was observed in the case of a bastard between *H. excellens* and *H. aurantiacum* where the germ-cells of the parent-plants have each 18 gemini-chromosomes and a number of unpaired ones, while the bastard in the heterotypic division shows over 22 gemini plus a number of unpaired chromosomes. This depends thereupon, that some of the unpaired chromosomes in each germ-cell are homologous and therefore form gemini. A similar condition of things has also been shown by HOLMGREN (1919) in his important investigation of genus *Erigeron*.

Of extreme importance is a newly published work by TÄCKHOLM (1920) on the cytology of the genus *Rosa*. The purpose of that study was to learn to what extent the use of cytological methods of research could be employed in the elucidation of the problems that appear in the genus, distinguished by its enormous

polymorphy and its, in part, apomictical reproduction: the problems of the causes of polymorphy and the lines followed by the formation of species. The section *Caninae*, which contains the greatest part of the *Rosa*-vegetation of Europe, is characterized by the peculiarity of showing in the reduction-division both gemini and single chromosomes, usually 7 paired and 14, 21 or 28 unpaired, thus representing an analogous chromosome-condition to what the writer stated in the *Drosera*-bastard. In the other sections of *Rosa* only paired chromosomes are to be seen, 7, 14, or 21 gemini. These latter have exclusively sexual reproduction.

Triploid Roses, showing in the heterotypic division 7 paired and 7 single are hybrids, derived from two sexual forms possessing respectively 7 and 14 chromosomes in the germ-cells.

The *Caninae* are characterized by a quite peculiar type of reduction-division in the pollen mother cells, which differ in certain respects from other types of chromosome-distribution found in plants. The partners of the gemini pass to the poles, while the single still remain in the equatorial plate, where they undergo segmentation and later on begin their journey towards the poles.

In the embryo-sac mother cells a very curious and interesting type of reduction-division occurs. In the anaphasis the partners of the gemini pass in normal way to the poles, but usually all the singles pass undivided to one pole. The result is that the one daughter-nucleus receives 28 chromosomes, the other only 7. Eggs developed from such embryosacs containing 28 chromosomes are qualified for fertilization, which can be proved by the chromosome sets in hybrids derived from pentaploid species and normally sexual roses with 14 chromosomes.

A cytological examination thus can be of use when the hybrid origin is to be controlled. By a study of the chromosome-arrangement in the heterotypic division it is also possible in certain cases to find out to which group of species the parents of a hybrid belong.

In the genus *Crepis* the writer has shown, that the different species are characterized by very different number of chomosomes: 3, 4, 5, and 21 in the germ-cells. Hybridization experiments with *Crepis*-species with small number of chromosomes have been started by the writer. The dimensions of the chromosomes are also very different: in the nuclei with 3 chromosomes there are 1 very long, 1 short, and 1 chromosome of intermedial shape. In the species with 21 chromosomes 7 sets of these 3 chromosome-dimensions clearly can be distinguished.

Finally it may be mentioned, that HEILBORN by examination of a great number of *Carex* species has stated an interesting series of chromosome-numbers to exist in this genus.

GENETICS IN SWEDISH FINLAND

BY

Doc. HARRY FEDERLEY

HELSINGFORS, FINLAND

GENETICS IN FINLAND IS OF RECENT DATE. IN 1915 THE author of the present paper, then Lecturer on Zoology, was nominated Lecturer on Genetics, and in February 1921 the University made an application to the Government to have him nominated e. o. Professor of the said discipline. The author is the only person in Finland who has made this branch of biological research his speciality.

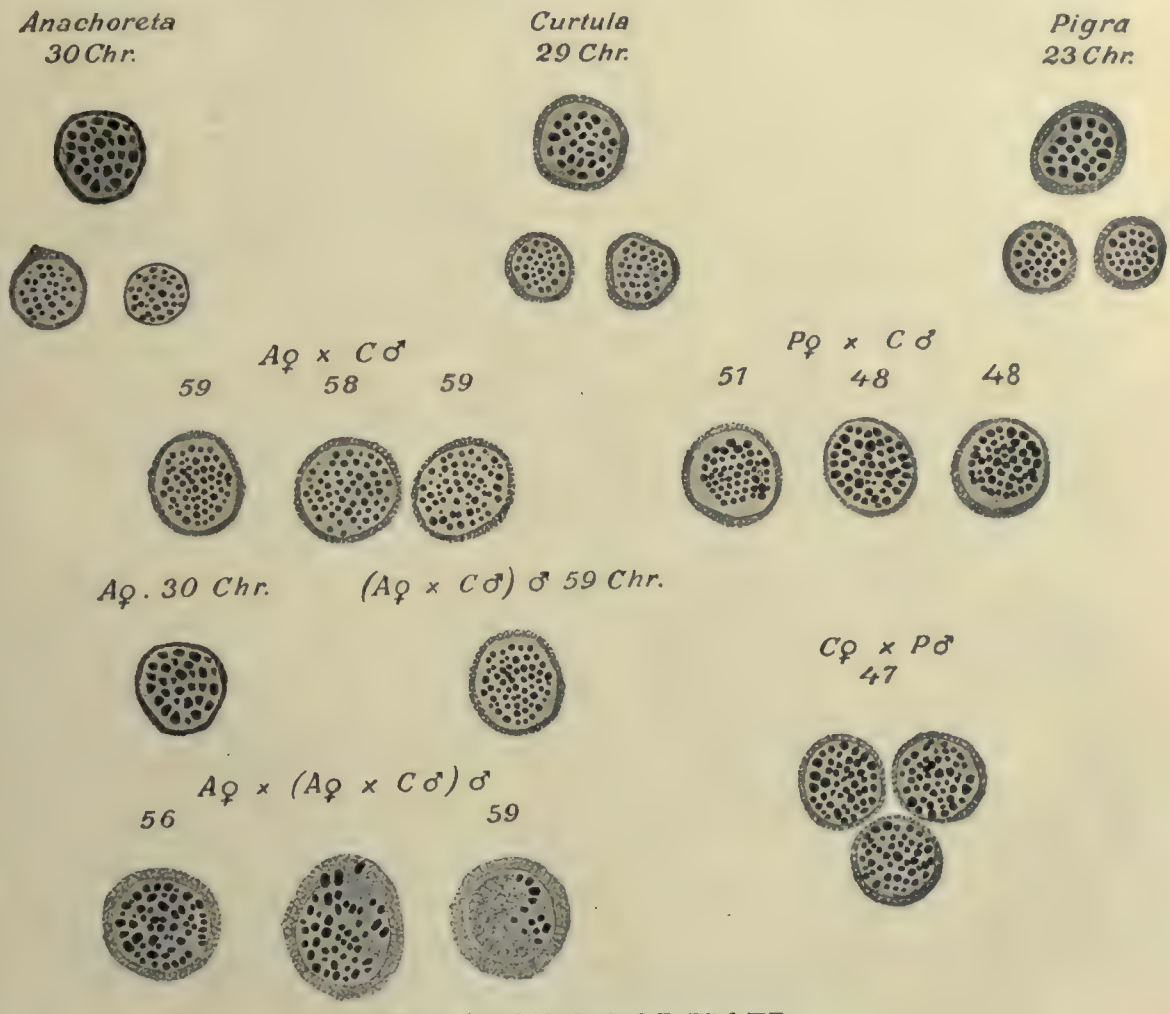
There being no Institute of Genetics, the choice of research is limited to such as can be made in the usual zoological laboratories, chiefly work of a cytological kind, or such mendelian experiments, as can be made at home. In virtue of the aforesaid the object of research was in most cases Genetics in moths, their larvae being comparatively easy to breed, as they do not need any special cages. Some attempted experiments with birds, amphibiae and mammals had to be given up, owing to the absence of suitable localities for the breeding of the animals.

A leading thought in most cases of research was to connect the experiments with careful studies of the behaviour of the chromosomes in the germ cells of the forms attained through crossings.

The first experiments had to do with hybridisation of species (1911). Reciprocal crosses were made between *Pygaera curtula* and *pigra* as well as *P. curtula* and *anachoreta* with a view of finding an answer to the question, if characters of species follow the mendelian law and segregate, or if constant intermediate hybrids arise. The F_1-individuals were in respect to most of their characters intermediate: only a small number of characteristics showed a greater or smaller degree of dominance. It was to be regretted that the F_1-individuals were sterile in a high degree and consequently only a few F_2-individuals could be obtained and from one crossing only. They were quite like the F_1-individuals. On the other hand the back-crosses with the parent species resulted in a greater number of larvae and moths. These $F_1 \times P$-individuals did not afford any proof of a segregation, expected in a mendelian cross. On the contrary, they rather proved the opposite, showing a great likeness with the F_1-parent, both as to their special characteristics and as to their general habitus. An explanation of the experimental results would be gained by an examination of the behaviour of the chromosomes in the spermatogenesis (1913).

The haploid number of the chromosomes in the three species are: *Pygaera anachoreta* ***30***, *curtula* ***29***, *pigra* ***23***. In the hybrids the full number is the sum of the two haploid sets that went in from the parents. In the maturation a few or no one of the chromosomes unite in pairs, but most of them or all fail to do so, so that the number of chromosomes after the first maturation-division is slightly less than or like the diploid number of the hybrid. Different types

of hybrids behave slightly differently in respect to the extent in which union in pairs takes place. The cause of this peculiar behaviour of the chromosomes is to be found in the fact, that the affinity between homologous chromosomes of the same species is lacking between the chromosomes of different species, united in the hybrids.



EXPLANATION OF PLATE.

FIRST AND SECOND SPERMATOCYTE EQUATORIAL PLATES OF *PYGAERA ANACHORETA, CURTULA* AND *PIGRA*.

First spermatocyte equatorial plates of the hybrid *anachoreta* ♀ × *curtula* ♂ with 58—59 chromosomes, so that none or only two chromosomes have united to form a pair. All the others are about half the size of the first and about the same size as the second spermatocyte chromosomes of the parent species.

First spermatocyte equatorial plates of secondary hybrid *P. anachoreta* ♀ × (*P. anachoreta* ♀ × *P. curtula* ♂) ♂ *with* 56 and 59 chrosomomes, (latter in two sections). Of the chromosomes about 30 are large, and consist of two units, paired together, presumably *anachoreta* chromosomes; about 26, resp. 29, are small, unpaired, presumably univalent *curtula* chromosomes.

First spermatocyte equatorial plates of the reciprocal hybrids between *P. curtula* and *P. pigra*: the chromosome number is 47—51, there is thus only 1—4 paired chromosomes, all others are univalent.

The figures mark the chromosome number after the maturation-division.

When the first spermatocyte-division takes place in the hybrid, all the unmated chromosomes divide longitudinally, but the few chromosomes that are mated, presumably separate. Consequently each of the daughter cells obtain the diploid number of chromosomes, except for the few that had been united in pairs. The second maturation-division, which is a usual longitudinal division, does not alter this fact, and every spermatozoa receives nearly all the one set of chromosomes from the one parent species, the other from the other parent species.

The peculiar behaviour of the chromosomes in the spermatogenesis of the hybrids explains, why a back-crossing results in a nearly uniform generation, which is very much like the F_1-parent. The spermatocytes of the F_1-individual contain all — or with few exceptions all — chromosomes of both parents. Consequently the descendants of an F_1-individual must of course be like the same. The result is triploid forms, which possess a diploid set of chromosomes of the one parent and a haploid set of the other.

The correctness of this opinion is corroborated beautifully by the spermatogenesis of such triploid hybrids. At maturation-divisions appear de facto both a set of bivalent chromosomes as well as a set of univalents. In the reduction division the united chromosomes separate, while the single chromosomes divide in the same manner as at a usual cell division. The spermatozoa of such a secondary F_1-individual have consequently the same set of chromosomes as those of the primary F_1-hybrid, and therefore a weakening of the characters of the one parent is not possible by continued crosses with the other.

In 1914 similar experiments have been made with some moths of the family Sphingidae. The hybrids between *Smerinthus populi* and *Sm. ocellata* also show in spermatogenesis a repulsion between the strange chromosomes; the same thing occurs in respect to hybrids between *Sm. ocellata* and *Dilina tiliae*. It was indeed surprising that the reciprocal crosses between the European species *Sm. ocellata* and his near relative the Eastasian var. *planus* gave an almost analogous result, though a somewhat greater number of chromosomes usually unite in this case.

An examination in 1915 of the hybrid between the African variety *austauti* and the European species *Sm. populi* showed, that in this hybrid in the greatest number of spermatocytes all the 28 chromosomes of both parents mate, but that in some spermatocytes 29—33 chromosomes could be counted. In these lastnamed-cells 1—4 pairs of chromosomes did not possess the needful affinity towards each other in order to pair.

Also in a hybrid between two species of the lepidopterous family Notodentidae, i. e. *Dicranura erminea* and *D. vinula* a completely analogous state of things as in the closely related *Pygaera*-hybrids could be described 1916.

A comparison between the results, arrived at through examinations of a number of hybrids, seems to prove, that the farther from each other the parents stand in the system, the fewer chromosomes mate. It was therefore a surprise, that the hybrid between *Chaerocampa porcellus* and *Ch. elpenor*, two Sphingides, of which species both of them have 28 chromosomes, had the same number too, and otherwise did not show any anomalies in their spermatogenesis (1916). A critic has expressed the supposition that a mistake might have been made, but this is impossible. The only examined testis was got through exstirpation from

a living chrysalis, which afterwards gave a typical hybrid imago male. As *porcellus* and *elpenor* by certain authors are considered as belonging to different genera and must certainly be regarded as good linnean species, one would have expected a reduced affinity between their chromosomes.

Later on quite analogous phenomena like the ones described by me in the lepidopterous hybrids, are pointed out in the maturation of the gametes in species hybrids of mammals, birds, other lepidoptera, and a great many phanerogamae. Thus it appears, as if the conclusion were warranted, that the lacking power of the chromosomes to mate was a characteristic of most species hybrids, and further, as if a tripleentente of *chromosome affinity, fertility and segregation* stood against a triplealliance of *chromosome repulsion, sterility and constant-intermediate inheritance.* It would be of greater interest still to try and get this hypothesis confirmed through continued attempts at crossings between different species and races.

But even otherwise the experience thus gained is of general interest. It shows, that at the side of the alternative or mendelian type of heredity, another type exists, that is, the constant-intermediate one, which is however of lesser significance, as it must always in its most extreme form produce sterility. But both these forms can also exist side by side in the same hybrid individual, as has been proved at least in one case. I refer to the fact that some chromosomes unite, while others do not: then all the factors, situated in the paired chromosomes, segregate, all those in the not united chromosomes, show a constant-intermediate type of heredity. In reference to the latter factors, not pure gametes are formed. But these are not a result of an amalgamation between inherited factors, as was generally assumed earlier, but on the contrary produced by the slight affinity between the strange chromosomes, through which the mechanism, needful for mendelian heredity, is rendered incapable of functionating.

An earlier opinion was, that mutations and new combinations were the only ones to be reckoned with, when new species arose. However, I am of opinion, that the new forms arising out of new chromosome combinations, could be imagined to play a not quite unimportant part, and especially with regard to lepidoptera might explain the very much varying chromosome number we find in this order.

From a cytological point of view, too, the observations thus made are of no slight interest, for they show, that chromosomes retain their individuality, though they have existed for two generations in a foreign cytoplasm. Continued examinations, especially with regard to the heterochromosome behaviour, of great value in moths, will doubtlessly afford new and interesting ideas. I am going to cite one here.

The hybrid between *P. anachoreta* ♀ and *curtula* ♂ is interesting, in so far as the larvae show a sexual dimorphism of highest degree, a fact which is very rare among the lepidoptera and of which the parents do not show the least trace. The female hybrid larva is always like the father species *curtula*, but becomes much larger than the aforesaid and grows very slowly. The male larva, on the contrary, is on a whole like the mother species *anachoreta*, of the same size and developes as quickly. The larvae in the reciprocal cross are however exactly alike in both sexes and impossible to distinguish from the said male hybrid larvae. Thus it is to be assumed that this is a case of criss-cross inheritance in a species hybrid — to my kowledge the first known one. The back-crossings made with

the F1-males also corroborate this. And it becomes still more probable through being able to SEILER and DONCASTER prove, that the lepidoptera, contrary to other insects, are heterogametic in the female genus. My experiments to prove the existence of heterochromosomes in *anachoreta* females, have hitherto led to nothing, and since the summer 1917 I regret to say, that I have not succeeded in getting the necessary material of this species, rare in Sweden and Finland.

I will only add a few lines about my purely experimental research.

A small paper in 1916 treats of the dimorphism of the Sphingid larvae, a question much discussed by evolutionists. Through the four possible crossings between imagines, derived from green and black larvae of *Chaerocampa elpenor* it is proved, that both the forms are isogenic and thus do not possess any selectional value. The species consequently possesses a factor, which under certain circumstances has the power of producing black pigment in the skin of the larva, under others, however, lacks this power. The said factor is inherited both if it has been activised, as is the case with the black larva, or if it remains inactive, as is the case with the green form. The contest about the different value of selection of the different phaenotypes and their phylogenetic age has consequently been a contest about the beard of the pope.

Since 1914 the author has been working at a mendelian analysis of the lepidopterous formae *Spilosoma lubricipeda*, *intermedia* and *zatima*. *Zatima* is a strongly, *intermedia* a weaker melanistic form of *lubricipeda*, which is yellowish with a small number of tiny little black spots. The melanism is produced by a factor ***Z***, which is homozygotic in *zatima* ***ZZ*** and heterozygotic in *intermedia* ***Zz***: it fails in *lubricipeda* ***zz***. But this factor ***Z*** is altered in a high degree by a number of polymere factors, which strengthen the influence of ***Z***. If the polymere factors are all homozygotic, a ***ZZ***-individual becomes nearly uniformly black, however if they are absent, a *zatima* may become nearly white with just a few black spots. On the ***Zz***-individuals the influence of the polymere factors is just as strong, while the rare and small black spots in *lubricipeda* are changed very little. Through the influence of the polymere factors, not yet finally analyzed, a continuous series of phaenotypes is produced, ranging from an almost purely black specimen to a nearly white one. It is of course theoretically possible to receive all these different phaenotypes, which are also different biotypes, in one sole crossing; in fact it has been successfully performed, with the exception of the very rare most extreme forms. A preliminary paper about this research was published in 1920.

For the sake of completeness I beg to state, that Professor ALEX. LUTHER has examined the heredity of *Agriolimax agrestis* and *Agr. reticulatus* and among other things he has found, that a totally albinotic form of the latter, observed in nature, differs from the normally pigmented one only as to one factor: further that the manager of the zoological garden at Högholmen near Helsingfors Mag. phil. ROLF PALMGREN during the last few years has attempted a few hybridisations between different species and races of mammals and birds and succeeded in arriving at some new and remarkable hybrids.

Further I beg to add, that papers about the significance of heredity in connection with some human diseases and anomalies, are to be found in the transactions of the Society of Physicians (»Finska Läkaresällskapets Handlingar»).

PLANT BREEDING IN SWEDEN

BY

Dr. HANS TEDIN

SVALÖF

THE PRACTICAL PLANT BREEDING IN SWEDEN IS AS TO origin and development intimately associated with the name of Svalöf, a village, situated in Skåne, the southermost province of Sweden, about four Swedish miles from Malmö. On the initiative of BIRGER WELINDER in Svalöf, »The South Swedish Association for the cultivation and improvement of seeds» was established in 1886. The idea won lively adherence so that two years later the Association was enlarged and included the whole country. In 1889 a like association was organized for Middle Sweden, but after five years only, the two associations were united to one organization now officially called the *Swedish Seed Association*. From an inconsiderable origin the Association has, little by little, attained a great development. It has, as will be shown in the following, been of extraordinarily great importance for the improvement of Swedish agriculture and the increase of its production. Svalöf sorts have been proved on trial on both a large and a small scale all over the world, wherever a rational growing of the common cereals, wheat, rye, barley and oats is carried on. In several European countries, and not only in the countries nearest Sweden certain sorts have been greatly spread.

From north to south, Sweden extends over 14 degrees of latitude. The climate and soil in different parts are therefore very different, and the general conditions for agriculture show considerable variations also. In order to look to the need of different provinces as to better sorts, more suited to their locality and with a higher yield, branch stations were established in different parts of the country. There are now eight such stations, the northermost being situated somewhat north of the 65th degree of latitude, near the town Piteå. The chief aim of these stations is to find out through systematic and comparative field trials, which sorts are best suited to the different provinces, and also to carry on local plant breeding, if such is necessary for the production of still better sorts in the different parts of the country.

A proof of the interest, which the Association and its work aroused from the very first, are the contributions, which have been given both from private men and from the public. Of the 26 Provincial Agricultural Societies of Sweden one after another began to help the Association, so that in 1890 all of them contributed with large or small sums to the support of its work. From the government, which during the first years only gave temporary subsidies, the Association has now, since the year 1891, received an annual and from time to time increased supply. The contributions from the Provincial Agricultural Societies were discontinued in 1914, but then compensation was given by the government. The supply, which the government last year granted the Association and its branch stations for 1921, was in all 185,600 crowns.

The first director of the Association was Th. von Neergaard, a mathematician and chemist from Holstein. He, however, kept the leadership till 1890 only, when he was succeeded by professor N. Hjalmar Nilsson, who is still director. In connection with the growth of the Association and its work the staff of trained botanists has also been increased. There are now 11 specialists at the main station and eight superintendents of the branch stations as well, and several extra or temporary assistants.

At first and for a rather long time the plant breeding was limited to wheat, oats, barley, peas and vetches. As time passed all other agricultural plants grown in Sweden were subjected to this improvement: rye 1900, forage plants and potatoes 1905, field roots 1914, flax and rape 1918. Certain crops were alotted to different experts, belonging to the Association, and each one, as director of a section or assistant is to lead the work and is responsible for the crops or the group of crops alotted to him. The improvement of wheat and oats was lead by prof. Hj. Nilsson till 1900. His work was then continued by Nilsson-Ehle till 1915, when it was handed over to Dr. Åke Åkerman. The agronome Pehr Bolin had the barleys till 1900, when the responsibility therefore was taken by the author, who since 1892 has been entrusted with the improvement of peas and vetches. Agronome E. W. Ljung, the secretary of the Association, is responsible for rye, Mr. Joh. Fr. Lundberg for potatoes, prof. Nilsson and Agronome Gustav Sundelin for field roots, and Dr. Nils Sylvén for flax and rape. Dr. Hernfrid Witte, who hitherto was head of the section for forage plants, has this year become director of the Swedish Moor Culture Association and a new leader has not as yet been appointed.

At first the »*methodical system of mass selection*», a system at that time commonly followed all over Europe, was adopted. The aim thereof was, by selection year from year, to change a sort in a certain desired direction. It was also at that time believed, that correlations between different factors were common and it was thought, that in these one could find guidance for the selection. It was thought that a compact head went with stiff straw and that from the different types of the panicles of oats conclusions could be drawn as to their yielding power. The above mentioned are only a couple of the supposed correlations, which were thought to be very important for the selection and breeding of plants. In order to simplify the measuring and weighing of heads, kernels etc., used as a basis for the selection, some mechanical instruments were devised, such as the automatic classificator, to determine the density of the heads, the automatic weighing machine, for the sorting of heads according to their weight and a riddling-machine, for the controlling of the size of the kernels etc. All these, however, are now, since many years, only of historical interest.

From the results of the works of the first years, several valuable selections were made of those sorts of barley and oats, which were subjected to comparative field trials and were then found to be mostly worth cultivating (Probsteier Oats, Chevalier Barley, Plumage Barley, Printice Barley etc.). As products of this »mass selection» may also be mentioned the sorts, which at the same time, 1895, were put forth on the market: Borstlös Propsteierhavre (Awnless Probsteier Oats), and Renodlad Squareheadvete (Selected Squarehead Wheat). The latter

was gained by repeated selections of an English Squarehead wheat, imported about 1880, and which after severe winters was at last acclimated. By these repeated selections the variety gained great uniformity and also remarkable winter-hardiness without loosing its Squarehead type. While the imported Squarehead — and as is yet the case with this imported variety — was not even winter-hardy enough for the most southern province of the country and consequently did not give a greater average yield than the old, unimproved, native »land wheat», the Selected Squarehead greatly surpassed this latter sort not only in Skåne but also at a branch station at Ultuna in Middle Sweden.

Professor Hj. Nilsson, who when he assumed the leadership as director of the Association, was Lecturer of Botany at the University of Lund, had, when he attended the University, studied systematic botany and had made himself known as a distinguished florist. It was therefore quite natural that since he came to Svalöf greater attention was paid to the botanical and morphological characters of the different parts of the plants, and the differences in these, by which they are distinguished from one another. A closer examination of the morphological differences and the observations, which then were made as to the constancy of the progeny, depending upon whether it came from one or several plants, lead up to the *System of Pedigree,* 1892. It was found that almost as regularly as the progeny which came from a single plant was constant, just as often was the progeny, coming from several plants; mixed and ununiform, even if these plants were alike in appearance.

The System of Pedigree was certainly no new system, it having already been used for several decades by other investigators and plant breeders. Peculiar for Svalöf, however, was the consistency and extension with which it was immediately adopted. The first direct result of this application was the discovering of the great multiplicity of forms, which is typical for the old »land sorts» of cereals. Already during the first years after the system had been adopted a very great number of hereditarily (genotypically) different forms were separated from old native and foreign sorts of all the crops, with which the work was carried on — from common vetch *(Vicia sativa)* for instance several hundreds were gained.

From deviations in the density of the heads of wheat and the characters of the panicles of oats, from certain characters of the kernels of barley, the colour of the blossoms and seeds in peas and vetches etc. systems were devised by which the great multitude of types was arranged into different groups. And even if these systems were more artificial than natural and even if they were of no great use for the breeding work, still they to a great degree facilitated the handling of the varieties and the forms. In order to gain such a desirable facility, genealogical tables of the plants were also devised and exact stock books with notes about the appearance of the different types in the field and about their chief characters were kept. The keeping of stock books, however, was soon given up. It was considered unnecessary, as the details about the types, which were registered in them, were to be found almost as easily in the »field books», which were annually kept and which are still kept about all the plots, cultivated during the year, and in these books notes are made about all the types. Genealogical tables are still made. A complete list of ancestors is always useful for instance in order to get a summary of the numerous progenies of different generations of crossings.

As has already been remarked, the separated forms were from the beginning constant. The crops before mentioned, wheat, oats, barley, peas and vetches, which at the time of the adoption of the pedigree system had already been investigated, are typical self-fertilizers and the pedigree sorts are therefore pure lines. That this constancy was perfectly permanent was not clear from the beginning. Hoping that they could still be improved, the pedigree sorts of the above mentioned crops were also subjected to a repeated selection which, however, naturally was without result.

In oats and still more in wheat and seemingly also in vetches spontaneous crossings occasionally take place. This is also the case with common six-rowed barley *(Hordeum tetrastichum)*. Even spontaneous variations (mutations) can arise. According to NILSSON-EHLE, for instance, who first observed the fact, wild-oat types often, if not regularly, arise as a result of »loss-mutation» in originally constant pedigree sorts of white oats. And when an originally constant pedigree sort thus for one reason or other becomes ununiform it is naturally necessary to make a new selection in order to regain the original form.

The constancy of the types warrants that the advances which they represent will be permanent. Thanks to this fact it will also be possible to form a far more accurate opinion as to what conditions the different sorts require, than when dealing with mixed sorts. These sorts can namely be changed hereditarily by external circumstances. According as the agricultural conditions change, now one and now another of the mixed parts is favoured and increases in quantity at the cost of other parts. Thanks to their constancy and uniformity the pedigree sorts are also easier to recognize and consequently give greater possibilities for an effective control, a fact which is a necessary condition in order to carry on a real and an honest trade with improved sorts. Nothing is gained by getting an improved sort which can not be recognized but is easily mistaken for less valuable sorts. Both difficult and expensive measures would at least have to be taken in this case in order to prevent the latter being launched on the market under false flag.

It must, as is easily understood, take several years before the first pedigree sorts were ready for sale, but thereafter these were rapidly followed by like sorts, a proof of the value of this method for plant breeding. Many of these sorts, raised by line selection from old sorts are no longer cultivated, they having been superseded by still better sorts, but many of them are still cultivated and successfully compete with the best sorts, produced during the last years.

Thus it has been observed that the Segerhavre (Victory Oat, 1908) as well as the Guldregnshavre (Golden Rain Oat, 1903), both white oat sorts and both descending from the Milton Oat, a mixed sort of the Probsteier type, which is said to come from America, have been difficult to surpass. (The numbers mentioned in the parenthesis, both here and in the following, name the year, when each sort was put forth on the market.) Of black oat sorts the Stormogulhavre (Great Mogul Oat, 1901) still gives the highest yield. This type as well as the Klockhavre (Bell Oat, 1901) is bred from the Black Tartarian Plume Oat. On account of its late maturity the Great Mogul Oat has not, however, gained that importance within the black oat districts, which are situated in Middle Sweden especially, which it otherwise would have done.

PROFESSOR PONTUS FAHLBECK.
Demographer, Nationaleconomist, Djursholm.
* 15/11 1850.

PROFESSOR GUSTAV SUNDBÄRG.
Demographer, Uppsala.
* 11/12 1857. † 20/11 1914.

ISIDOR FLODSTRÖM.
Demographer, Stockholm.
* 25/4 1856.

PROFESSOR KARL BERNHARD WIKLUND.
Philologist, Ethnographer, Uppsala.
* 15/3 1868.

Characteristical for the black oat sorts is the fact that their straw developes relatively late but in return they stool much more luxuriantly, qualities which make them especially suitable for the stift clay soils of Middle Sweden and which at the same time give them a greater power of resistance against the Frit Fly *(Oscinis Frit)*, which otherwise can do much damage, especially if the sowing has been late. Dr. ÅKERMAN hopes to be able by crossing to make the most of this quality in the black oat sorts when continuing the improvement of white oats.

Of barley sorts the Prinsesskorn (Princess Barley, 1897), taken from Prentice Barley, a sort, which originally came from England, and the Gullkorn (Golden Barley, 1913), out of an old native land barley from the Island of Gotland are still most generally grown in South and Middle Sweden. Besides these, both Chevalier II (1900), taken from Horsfords Crossbred Chevalier from America, as well as Svanhalskorn (Swan-neck Barley, 1899) and Primuskorn (Primus Barley, 1901) are still considered as the most suitable under growing conditions more particularly suited to them.

The sorts of peas and vetches, which during the years 1900—1907 were put forth from Svalöf have only just lately begun to get competitors. These were in number 4 respectively 2 and all improved by line selection from foreign mixed sorts. The Svalöf sorts of peas have by their considerably higher average yield (the increase is 20 to 30 to 40 %) made the cultivation of peas much more profitable than hitherto.

The renewal of sorts of winter wheat has been the greatest, for the cultivation of all those pedigree sorts which were put forth first has been given up, these being surpassed by new sorts with a still higher yield. These sorts at that time however marked a great progress. The English Squarehead wheat produces under favourable conditions and with sufficiently mild winters 50 % higher yield than the Swedish land wheat. But, by reason of its lack of winter-hardiness the average yield of the former sort was even in the most southern parts of the country scarcely superior to that of the latter sort. Thanks to a greater winter-hardiness Svalöfs Extra Squarehead Wheat (1900), taken by line selection from imported Squarehead, gave an increase of the average yield with about 12 %. And the increase for Grenadier Wheat, a pedigree sort, taken from a Squarehead sort, imported from Scotland about 1880, was not less than 20 %, despite a winter-hardiness somewhat lower than that of Extra Squarehead. But Grenadier Wheat has hardly been surpassed by any hitherto tested sort, when speaking of its specific yielding power, by which is simply meant the yielding power of a sort when this power is not lessened by too severe winters or by other temporary causes. A chief quality of Grenadier is also its unusually stiff straw. For those districts in Middle Sweden, which are more favourably lotted for wheat growing, the Borevete (Bore Wheat, 1902) and the Pudelvete (Poodle Wheat, 1910), both pedigrees taken from a sort imported from Holstein by NEERGAARD had an increase of about 10 % of the average yield, when compared to native land wheat.

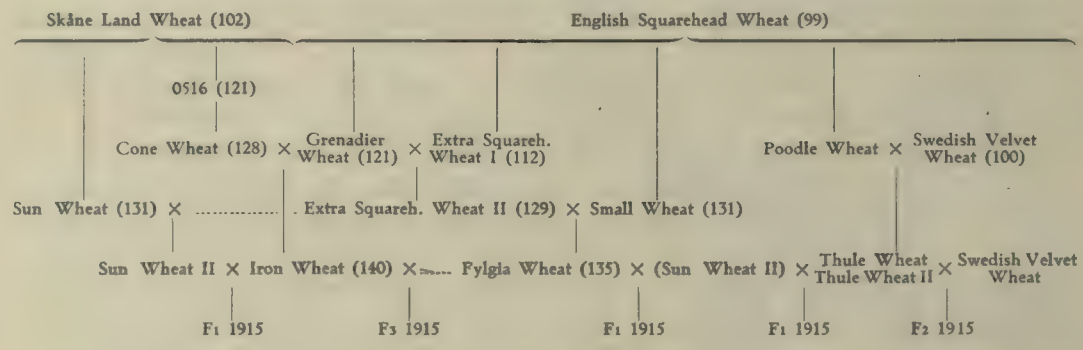
These sorts have now almost entirely disappeared. When improving winter wheat by crossing, these sorts, however, have been of great use as will soon be observed.

Crosses of both barley and peas were made to a great extent already about 1890 and also of winter wheat later on during the same decennium. All these

crosses, however, were made without any special object, although perhaps in some cases with the hope of getting a practically useful result from some of them. Crossing was at that time generally considered as a way of stimulating or producing a variation. It was not until after the discovery of the Mendelian laws of segregation that artificial cross-fertilization became used systematically with a definite purpose and to a great extent. The honour of having applied these laws in the practical breeding work is due to NILSSON-EHLE, who at once understood the value of this discovery when improving both oats and winter wheat especially. It is easy to understand that the winter wheat in this case was especially easy to work with. It now became the chief aim of the workers to combine the high yield of Squarehead wheat with the hardiness of the old native land sorts to a greater extent than they had hitherto been able to do by line selection. When improving barley and oats, on the contrary, there have been no such decisive characters of yield to work with. There have been no foreign sorts of barley and oats either, which have been as superior to the old Swedish sorts as Squarehead to old Swedish land wheat. At the beginning nobody hoped, not even NILSSON-EHLE himself, that the yielding power of the former and the hardiness of the latter could be combined to so great an extent as has now been done by him.

The purpose of crossing sorts with characters of different degrees of value, for practical use, is to produce new combinations of characters which from a practical point of view are still more valuable. Cross-breeding is a combination-breeding. The way of working and the results already gained are clearly shown in the following scheme, borrowed from NILSSON-EHLE. The numbers in parenthesis give the average yield of the trials made at the Association at Svalöf. These are expressed in relative numbers compared with Svenskt Sammetsvete (Swedish Velvet Wheat) = 100. One of the sorts has no name and is therefore called by its stock book number 0516; a stock book number is in reality a substitution for a name and is used in all tables, genealogical schemes, field books etc. were the sorts are mentioned.

SUMMARY OF PART OF THE CONTINUED COMBINATION WORK WITH WINTER WHEAT AT SVALÖF.



To describe the different characters of the crossed sorts more closely and the purpose of each cross would take too long time. Iron Wheat, for instance, has inherited good winter-hardiness and a high degree of resistance against yellow

rust from Kottevete (Cone Wheat), a sort which very likely is a product of a spontaneous crossing between land wheat and Squarehead wheat, and from Grenadier Wheat high specific yielding power, stiff straw, relatively early maturity and relatively good kernel quality. In the same way Fylgia Wheat has inherited high yielding power, relatively good resistance against yellow rust and relatively early maturity from Smaahvede (Small Wheat), a Danish improved sort, and from Extra Squarehead II relatively good winter-hardiness and relatively early maturity. Both are intended for southern Sweden and Iron Wheat for Skåne especially. The importance of its high yield can easily be understood when one hears that about half of the wheat, produced in Sweden, comes from this province. None of the sorts mentioned in the summary, however, have all qualities to the highest degree and therefore the workers hope, by continued crosses to be able to produce still better combinations. Besides with the sorts mentioned at the bottom of the summary, Dr. Åkerman is now also working with crosses, which he himself has made.

Systematic crossing has also been sucessfully used when improving other self-fertilizing crops and has given rise to several valuable sorts even if it has not been able, from above mentioned reasons, to show such fine results as with winter wheat.

I will be brief when speaking about the other plants, rye, field roots and forage plants etc., mentioned in the beginning. To force typical cross-fertilizers to self-fertilization, year after year, can by degrees result in a weakening of the progeny. This seems for instance often to be the case with timothy, according to Witte who has also shown a greatly different power of self-fertilization in different strains of this grass. They vary from almost self-sterile strains to such with a very high degree of self-fertilization. Heribert-Nilsson at the plant breeding institution of Weibullsholm, about which more will be mentioned later on, has found the same fact to be true with rye.

The pedigree method, however, is also used when improving cross-fertilizers, but naturally with necessary care and combined with mass selection. When improving these crops systematic crossing is also used. The methods of the work must of course vary in each case according to the plant and the chief object of the breeding. In order to avoid spontaneous undesired cross-fertilization different isolating methods are used.

The work with the plants in question has also made considerable progress. Three sorts of rye have hitherto become of practical use, two especially for southern and one for middle Sweden, and all superior to the sorts before cultivated. Rye is, in view of the extension of the cultivated areal, next to oats the most important cereal in Sweden and for bread uncomparably more important than wheat. The former occupies about $3^1/_2$ times as large an areal as the latter. It is easy to understand what an increase of the yield of rye per hektare would mean for the nourishment of the people.

Even of several of the chief grasses have been produced strains, improved in different respects, with higher yielding power than those hitherto cultivated and guaranteeing a more even and a more uniform development of the mixed plants of the artificial meadows, a necessary condition for a good quality of the hay.

Even several new sorts of potatoes have during the last years been put forth. No new sorts of flax and rape can as yet be ready, but they are being successfully investigated. Svalöf sorts of different kinds of field roots (mangels, Swedes, turnips and carrots) cannot be said to be superior to all other sorts but they stand on a level with the best ones. To be able to keep them on this high level, so that they do not decline, requires continuous attention and constantly repeated selections founded on a careful investigation of the chief characters of the mother plant and of the progeny. Professor HJALMAR NILSSON has also during the last years begun to work with mangels with the purpose of producing sorts comparable in uniformity and constancy with those of self-fertilizers. This he intends to achieve by a more strictly conducted pedigree selection and an artificial crossing of sister individuals most like each other.

As a contributive cause of the high average yield of Iron Wheat is also mentioned a high degree of resistance against yellow rust, a disease which some years appears and ravages such sorts as are less resistant. Besides yellow rust a large number of other dangerous plant diseases are already known, even such as are caused by animal parasites, towards which different sorts of the same crop behave very differently, a fact which has also been considered in the breeding work. The producing of sorts resistant against diseases will surely be an effective remedy against these plant diseases and thus a way of increasing the production. Another important problem, upon the solution of which work has already been begun, is the improvement of the kernel quality, especially in wheat in order to produce sorts better suited for bread-baking — without mentioning all other future objects of improvement.

The field trials are an important part of the improvement work. They are the beginning and end of all breeding, for without good trial plots one works as a blindman and the whole improvement work floats in the air without the firm basis which they form. It is namely only by comparative trials that the eventual superiority of a new sort to already cultivated ones can with certainty be determined. But one thing is certain, the better the sorts get the less progress can be expected. The trials, however, must also be more exact and more free from errors in order to be able to determine accurately the differences that possibly exist between the sorts. The improvement of the trial system, so that the trials become as reliable as possible, is one of the most important objects of the plant breeding. In Svalöf the principle generally followed from the beginning has been to give the sorts in the trial-plots no better conditions than they get in the general cultivation, apparantly a quite correct principle, the strict accomplishment of which has been of great benefit for the work.

The *General Swedish Seed Company* was founded 1891 along side of the Swedish Seed Association, with the purpose of distributing the new sorts to the farmers. It is exclusively a commercial company, with its main office at Svalöf. The Company, which alone has the right, receives the improved sorts from the Association according to certain rules, sanctioned by the Government. They cultivate them first on their own farms, which together cover a field area of about 1,500 hektares, and also by contracts on fields belonging to farmers all over the country. Last year these cultures on fields belonging to private farmers together

covered an area of 6,000 hektares. All cultures are inspected while growing by the specialists of the Association. The entire seed business of the Company, thus the business with imported foreign seeds also, is under the strict control of the Control Office of the Association of which Mr. J. N. Wallden has been superintendent from the beginning. All deliveries sent out by the Company, from the largest to the smallest, are delivered under the seal of the Association, and with a guarantee as to purity, germinating power etc. The number of sealed sacks delivered last year was about 133,000, and all the seed delivered amounted to about 8,200 tons. The annual export of elit and original seed of Svalöf sorts amount to about 1,000 tons. Last year the Company paid the Association 117,500 crowns in compensation. The work of the General Seed Company, controlled by the Seed Association, has greatly helped to bring the seed business to the relatively high position which it now holds in Sweden.

The affairs of the Company and the Association are administered by different councils. One member of the council of the Company and five belonging to that of the Association (7 in all) are chosen by the Government in order to be able to control the work of both and to excercise influence as to the use of the state subsidies. The Association is also under the control of the Royal Board of Agriculture, which is subordinate to the Agricultural Department and is the highest administrative authority for agriculture.

As well as at the Swedish Seed Association, plant breeding is also carried on to a great extent and according to quite modern principles and methods at *Weibullsholm*, a plant breeding institution near Landscrona, a town situated a couple of Swedish miles from Svalöf. The work there began about fifty years ago. The father of the present owner began about 1870 to cultivate and sell seed from field roots as a by-trade. He soon began to try to improve these also, first by mass selection of roots, according to their form, but later on with guidance of their specific weight, gained by sinking them into a salt-solution of a certain concentration. About 1890, when the eldest son had begun to devote himself to the improvement work, new principles were introduced, which were of decisive importance for the future development of Weibullsholm. The pedigree method began to be adopted 1898. The first scientist, Dr. Birger Kajanus, was engaged 1907. The improvement work is now carried on by four sections, each of them with a scientific botanist as leader of the breeding work, assisted by an agronome as leader of the practical trials. Kajanus has devoted his attention to winter wheat, six-rowed barley, peas, vetches and forage plants. Dr. Nils Heribert-Nilsson, Lecturer of Genetics, is responsible for rye, oats and potatoes, Dr. Carl Hallquist has field roots and two-rowed barley as his speciality and Amanuensis Carl Hammarlund has charge of the vegetables. The latter is also head of the Control Office of the Institution. An extensive seed business is namely combined with the improvement work. The leader of the whole firm is Harry Weibull, while three of his brothers are responsible for a department each.

Since many years the firm has naturally dealt with its own improved sorts and strains of all different kinds of field roots and their present sorts compete with the best ones from Svalöf. As results of the improvement work it has also

put forth on the market two winter wheat sorts, two rye sorts, one oat sort, two pea sorts, and also strains of the most important forage grasses. It has also its own sorts of vegetables as well.

One of the wheat sorts, Standard Wheat, which will be put forth this autumn and which is intended for the southermost provinces is produced by artificial crossing between Iduna Wheat, from Weibullsholm about ten years older, and a Danish sort. Storm Rye, characterized by its relatively short and stiff straw which makes it easier to cut with self-binding harvest-machines is produced from a German sort, Petkuser Rye, by repeated selections four years in succession, the first two years by line selection, the last two years by mass selection, by removing before the plants bloomed, all such as had straw higher than the average height. In specific yielding power, however, the Storm Rye is somewhat inferior to the mother sort. A new sort, Storm Rye II, with short straw as the first Storm Rye, but according to Heribert-Nilsson with a specific yielding power equal to Petkuser Rye has been produced by sowing like portions of Storm Rye and another pedigree with short straw together and letting them fertilize naturally.

The farms belonging to the firm occupy together an area of about 1,800 hektares, but it also has cultures by contracts with private farmers.

In view of the extension of the work and the knowledge of the object with which the work is carried on it will undoubtedly be of great importance for the Swedish agriculture. By its field root cultures, field root seed cultures and field root improvement the firm has been of a very great importance for the development of the Swedish field root growing.

In the year of 1906 *the Swedish Sugar Manuf. Company* began with seed culture and improvement of sugar mangels with the purpose of making all import of sugar mangel seed unnecessary. This work, which is lead by Dr. Hans Rasmusson has given the desired results. Thus the crop of sugar mangel seeds produced last year is adequate to the need of such seeds in Sweden. The sugar mangels grown from these native seeds can readily be compared with the best imported sorts and are in several cases even superior to these, this owing to the improvement work consequently carried on.

Finally, since some years a rather extensive breeding of vegetables is carried on partly at *the horticultural division of the Agricultural College at Alnarp*, situated about 1/2 a Swedish mile from Malmö, the work being lead by Mr. J. Rasmusson, and partly at one of the farms near Malmö, belonging to *the General Swedish Seed Company* at Svalöf, the work being lead by Professor H. Nilsson-Ehle and Dr. K. Kristoffersson. The improvement work has not as yet been carried on long enough to be able to influence the cultivation of vegetables in Sweden, but new improved sorts of different plants are now ready. And there is no doubt that the work will contribute to the improvement of this cultivation by providing better and more profitable material for it.

THE MENDELIAN SOCIETY IN LUND AND ITS PERIODICAL, HEREDITAS

BY

ROBERT LARSSON

EDITOR, LUND

THE REDISCOVERY OF THE MENDELIAN LAWS HAS GREATLY influenced every field of biological science. New lines of study were opened up by botanists and zoologists. From 1900 and onwards the experimental study of genetics was taken up the world over. The biologists at the University of Lund also participated in this work. The need of co-operation in matters of genetics was felt pretty soon. After some discussion the *Mendelian Society* was founded. This was on the 10th of december, 1910. The Society succeeded in obtaining the distinguished geneticist, Dr. H. NILSSON-EHLE, as head of the Society. He still holds this position. The work of the Society has consisted in arranging lectures and discussions on heredity and related topics. The Society has also had the privilege of seeing three of our most distinguished geneticists as its guests, Dr. W. JOHANNSEN from Copenhagen, Dr. E. BAUR and Dr. C. CORRENS from Berlin. These gentlemen have also joined the Society as honorable members.

The Society enlarged its program essentially last year when a periodical, *Hereditas*, owned and edited by the Society, was started. The purpose of this periodical is to publish Scandinavian, principally Swedish, research on heredity. The first volume is complete, and two parts of volume II have been published; the third part of the volume is in print. The five parts already completed contain various contributions from the vast field of genetics. The table of contents includes the following titles:

VOL. I:

Part 1: H. NILSSON-EHLE: Ueber Resistenz gegen Heterodera Schachti bei gewissen Gerstensorten, ihre Vererbungsweise und Bedeutung für die Praxis. — H. LUNDBORG: Hereditary Transmission of Genotypical Deaf-Mutism. — NILS HERIBERT-NILSSON: Zuwachsgeschwindigkeit der Pollenschläuche und gestörte Mendelzahlen bei Oenothera Lamarckiana. (With a summary in English.) — HANS TEDIN: The Inheritance of Flower Colour in Pisum. — EMANUEL BERGMAN: A Family with Hereditary (Genotypical) Tremor. — HANS RASMUSON: Ueber einige genetische Versuche mit Papaver Rhoeas und Papaver laevigatum. — Å. ÅKERMAN: Speltlike Bud-sports in Common Wheat. — J. RASMUSSON: Mendelnde Chlorophyll-Faktoren bei Allium cepa.

Part 2: H. LUNDBORG: Rassen- und Gesellschaftsprobleme in genetischer und medizinischer Beleuchtung. — HANS RASMUSON: On some Hybridisation Experiments with Varieties of Collinsia Species. — HALFDAN BRYN: Researches into

Anthropological Heredity. — Nils Heribert-Nilsson: Ein Uebergang aus dem isogamen in den heterogamen Zustand in einer Sippe der Oenothera Lamarckiana.

Part 3: Harry Federley: Die Bedeutung der polymeren Faktoren für die Zeichnung der Lepidopteren. — Hans Rasmuson: Die Hauptergebnisse von einigen genetischen Versuchen mit verschiedenen Formen von Tropaeolum, Clarkia und Impatiens. — H. Nilsson-Ehle: Multiple Allelomorphe und Komplexmutationen beim Weizen. (With a summary in English.) — Nils Heribert-Nilsson: Kritische Betrachtungen und faktorielle Erklärung der laeta-velutina-Spaltung bei Oenothera. (With a summary in English.) — H. Funkquist: The Inheritance of the Muzzle Colour in the Cattle Breed of Stjernsund.

VOL. II:

Part 1: C. Correns: Versuche bei Pflanzen das Geschlechtsverhältnis zu verschieben. (Vortrag gehalten am 10. Dez. 1920 zur Feier des 10-jährigen Bestehens der »Mendelska Sällskapet» in Lund.) — H. Nilsson-Ehle: Ueber mutmassliche partielle Heterogamie bei den Speltoidmutationen des Weizens. (With a summary in English.) — H. Lundborg: Rassenmischung — Vermehrte Heterozygotie (Genchaos) — Konstitutionsveränderungen — Habitus asthenicus sive paralyticus (Zunahme der Körpergrösse usw.) — Tuberkulose. Eine Ursachenkette. — K. V. Ossian Dahlgren: Vererbungsversuche mit einer buntblättrigen Barbarea vulgaris. — Å. Åkerman: Untersuchungen über Bastarde zwischen Epilobium hirsutum und Epilobium montanum. — C. Hammarlund: Ueber die Vererbung anormaler Ähren bei Plantago major. (With a summary in English.)

Part 2: Hans Rasmuson: Beiträge zu einer genetischen Analyse zweier Godetia-Arten und ihrer Bastarde. (With a summary in English.) — Otto L. Mohr: A Case of Hereditary Brachyphalangy Utilized as Evidence in Forensic Medicine.

* * *

The contributions will be written in English, German or French (*not* in Swedish). When necessary adequate illustrations, text figures or plates, will be provided. The journal is published in volumes of about 350 pages each issued in three numbers. The volumes will appear annually so far as possible. Subscriptions may be sent to the Editor, Mr. *Robert Larsson*, Adelgatan 7, Lund (Sweden). The subscription price for a volume — post free — is Twenty-five (25) Swedish crowns.

PART II.

FOLK- AND RACE-TYPES IN SWEDEN

NORDIC (TEUTONIC) TYPES

Jämtland farmer.

Photo. O. Olsson, Östersund.

The same.

Photo. O. Olsson, Östersund.

Peasant's wife from Västerbotten.

Photo. H. Rådström, Åsele.

Fisherman from Hälsingland.

Photo. J. O. Wiklund, Hudiksvall.

NORDIC (TEUTONIC) TYPES

Uppland crofter.

Photo. H. Lundborg, Uppsala.

Peasant's son, Gottland.

Collect. of Visby County Registry.

A crofter's daughter from Södermanland.

Photo. Ain. Bianchini, Stockholm.

Servant girl from Värmland.

Photo. H. Lundborg, Uppsala.

NORDIC (TEUTONIC) TYPES

Småland schoolchildren.

Photo. G. Heurlin, Stockholm.

A farmer's children, Värmland.

Photo. H. Lundborg, Uppsala.

NORDIC (TEUTONIC) TYPES

Old man from Dalecarlia.

Collect. of Dalarnes Hembygdsförbund.

Mother with her children.

Photo. Calla Sundbeck, Gränna.

NORDIC (TEUTONIC) TYPES

Schoolboy from Västergötland.

Photo. M. Janson, Mariestad.

Physician.

Private collection.

Schoolgirl.

Photo. H. Ljungkvist, Visby.

Young bride.

Photo. H. Ljungkvist, Visby.

NORDIC (TEUTONIC) TYPES

Student from Gottland.

Photo. H. Ljungkvist, Visby.

Lady-student.

Photo. H. Lundborg, Uppsala.

Swedish scientist.

Photo. Gerda Söderlund, Leksand.

Manufacturer.

Private collection.

NORDIC (TEUTONIC) TYPES

Officer, of the nobility.

Photo. Atelier Florman, Stockholm.

Artist.

Private collection.

Bishop.

Photo. Atelier Gifer, Härnösand.

Parish school master, aged 80, from Färö, Gottland.

Photo. H. Ljungkvist, Visby.

SWEDISH MIXED-RACE TYPES

Parish school master from Roslagen. Nordic type with Finnish blood.

Photo. G. Wallenius, Uppsala.

The same.

Photo. G. Wallenius, Uppsala.

Lady of Swedish-Italian descent.

Photo. H. Lundborg, Uppsala.

The same.

Photo. H. Lundborg, Uppsala.

SWEDISH MIXED-RACE TYPES

Old man from Dalarne (Dalecarlia). Swedish-Finnish mixed-race type.
Photo. K. Lärka, Sollerö.

Workman, strongly race-mixed with gipsy and Lappic blood.
Photo. Oskar W. Olsson, Hudiksvall.

Skilled smith of Swedish-Walloon-Jewish descent.
Photo. G. Reimers, Gävle.

The same.
Photo. G. Reimers, Gävle.

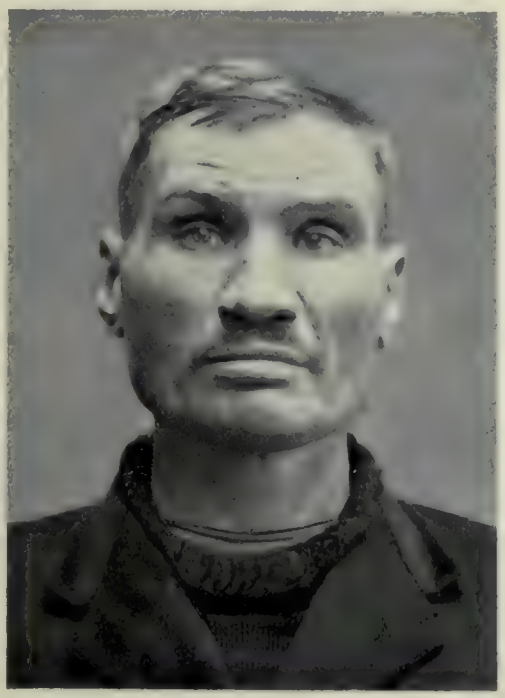
SWEDISH MIXED-RACE TYPES

Woman of manly type, socially of low standing.

Collect. of the Race-biological Institution, Uppsala.

The same.

Collect. of the Race-biological Institution, Uppsala.



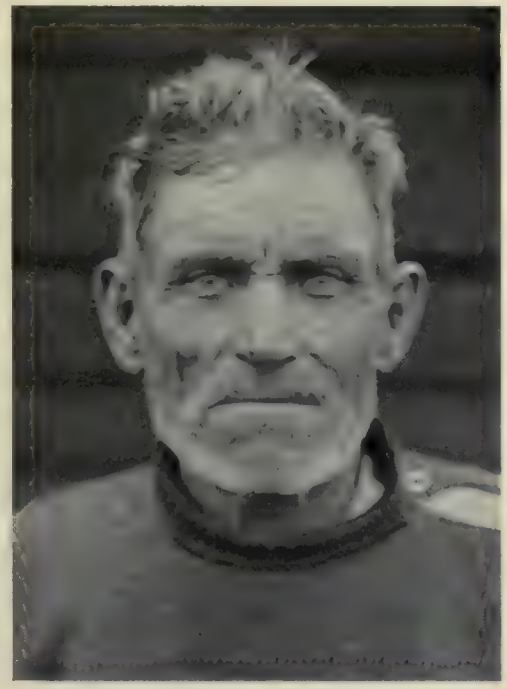
Workman, strongly race-mixed, of Finnish type.

Collect. of the Race-biological Institution, Uppsala.

Gipsy with Finnish blood. Criminal.

Collect. Thesleff.

FINNISH TYPES



Finn from Norrbotten.

Photo. Borg Mesch, Kiruna.

Finn from Norrbotten.

Photo. H. Lundborg, Uppsala.

Sailor from Roslagen.

Collect. of the Race-biological Institution, Uppsala.

Finnish woman from Värmland.

Collect. of Nordiska Museet.

FINNISH TYPES

Farmer from Norrbotten.

Photo. Mia Green, Haparanda.

The same.

Photo. Mia Green, Haparanda.

Student from Hälsingland.

Photo. G. Reimers, Gävle.

Factory girl.

Photo. Oskar W. Olsson, Hudiksvall.

FINNISH TYPES

Finnish type from Värmland.

Collect. of Nordiska Museet.

Finnish type from Värmland.

Collect. of Nordiska Museet.

Värmland Finn.

Collect. of Nordiska Museet.

Värmland Finn.

Collect. of Nordiska Museet.

FINNISH MIXED-RACE TYPES

The father a Lapp, the mother a Finnish woman from Norrbotten.

Photo. H. Lundborg, Uppsala.

Lappic-Finnish woman.

Photo. H. Lundborg, Uppsala.

Lappic-Finnish-Swedish mixed-race type.

The same.

The dark hair and the short head point to a Lappic descent; the long-drawn face with the straigt profile and nose to a Swedish. The great breadth of the lower part of the face (at the angles of the lower jaws) is a Finnish racial characteristic.

Photo. H. Lundborg, Uppsala.

Lapp-woman from Jämtland.

Photo. N. Tomasson, Åre.

Pupils at a Lappic training school from different Swedish Lappterritories, and a little Lappboy.

Photo. H. Lundborg, Uppsala.

Lappic mother with her twins.

Photo. H. Lundborg, Uppsala.

Lapp from Norrbotten.

Photo. H. Lundborg, Uppsala.

Old Lapp.

Photo. H. Lundborg, Uppsala.

LAPPS

Typical Lappland boy.

Photo. H. Lundborg, Uppsala.

Lapp-woman from the north of Lappland.

Photo. H. Lundborg, Uppsala.

Lapp-woman

Photo. H. Lundborg, Uppsala.

Lapp from Norrbotten.

Photo. Borg Mesch, Kiruna.

LAPPIC MIXED-RACE TYPES

Lapp-woman with Nordic blood.

Photo. H. Tegström & C:o, Luleå.

The same.

Photo. H. Tegström & C:o, Luleå.

Tramping Lapp with Nordic blood.

Photo. H. Lundborg, Uppsala.

Resident Lapp with Finnish blood.

Photo. Borg Mesch, Kiruna.

SWEDISH WALLOONS OF PURER WALLOON TYPE

The youngest Walloon descendant with his mother.
Photo. H. Lundborg, Uppsala.

Walloon from Uppland (so-called alpin type).
Photo. H. Lundborg, Uppsala.

Walloon type from Uppland.
Photo. Ellen Claeson, Uppsala.

Uppland Walloon.
Photo. Ellen Claeson, Uppsala.

SWEDISH WALLOONS (MIXED-RACES TYPES)

Walloon descendant with Nordic blood.
Photo. H. Lundborg, Uppsala.

Servant-girl of Swedish-Walloon descent.
Photo. K. G. Holm, Finspång.

Uppland Walloon.
Photo. Ellen Claeson, Uppsala.

Metal worker. Walloon from Östergötland.
Photo. K. G. Holm. Finspång.

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