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LEPROSY IN SWEDEN*

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Already in the XIIIth century there existed in Sweden a special kind of small hospital, so-called "spitals," which were run by the Church. One of the most important of them was that at Enköping, near Upsala—the old capital of the Kingdom—which "spital" is mentioned for the first time in 1278.

The "spitals" were open to poor and sick people but especially to those suffering from leprosy, which is evident from an "ordinatio" for the one mentioned, issued and confirmed sometime between 1367 and 1380 by Birger Gregersson, Archbishop of Upsala. He wrote, *inter alia*: "It is decreed that officials of the institution shall diligently search for such men and women within our Diocese of Upsala as may suffer from leprosy."

Those lepers who were without means were admitted and treated free of charge, while those who possessed any personal property had to assign this to the Prior or Director for the common weal of all inmates. The latter were to occupy themselves with prayers and divine services. Patients who were capable of performing manual labour had to assist in hay-making and harvesting.

There are no statistics available of the number of lepers in the country at that time. The information from the earlier centuries of modern times regarding leprosy is also very incomplete and unreliable, which is probably due chiefly to the fact that syphilis made its appearance in our country in the XVIth century.

The first two exact descriptions of leprosy (the nodular form) appeared almost simultaneously. One was a paper published by a

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¹ In this connection it may be of interest to mention that in one of the portals of Upsala Cathedral there is a sculpture of a leper dating back to probably the XIV century.

medical student, A. R. Martin, in the *Transactions of the Swedish Royal Academy of Science* for the year 1760; the other was a dissertation delivered by J. Uddman at the University of Upsala on June 17th, 1765, under the presidency of the great Linnaeus.

Fuller details of the history of leprosy in Sweden are to be found in a paper presented by E. Sederholm before the Second International Leprosy Conference at Bergen, in 1909. He stated that the number of cases at the end of 1907 was 89, the majority of which were of the maculo-anaesthetic form. Most of these cases originated from the northern provinces of Hälsingland and Dalecarlia. Each of these provinces is traversed by a large river, and they have always been the principal seats of leprosy.

At the Third International Leprosy Conference at Strasbourg, in 1923, I was able to state that the number of lepers at the end of May of that year had decreased to 37.

Though there have appeared no fewer than 17 new cases since then, the number at the close of 1937 had decreased to only 9 for the whole country. Of these cases, 4 of which are men and 5 women, 7 belong to the anaesthetic form and 2 to the nodular. Four of the patients are segregated at Järvsö, in the province of Hälsingland, our only leprosarium, while the others are being looked after in their own homes. Five come from Hälsingland, 3 from Dalecarlia, and the remaining one from Upland. The ages of the patients are: one, 82 years; two between 70 and 79; three between 60 and 69; and three between 50 and 59 years. The latest new case (a nodular one) was reported from Dalecarlia, in 1932.

Compulsory segregation does not exist in Sweden. On May 10th 1926, there was appointed a Government Inspector for Leprosy (the writer), who has to visit the lepers of the country at least once a year, to provide for them and their families—the poorest of which are in receipt of Government aid every year—to search for new cases, etc.

Even though we undoubtedly have to reckon with the possibility of new cases appearing sporadically in the old foci, especially in Hälsingland and Dalecarlia, it is highly improbable that leprosy will ever recrudescence seriously in our country, where hygienic conditions are being constantly improved. I think we may say that leprosy has already ceased to be a problem in Sweden, and in view of the great age of the majority of our lepers we are entitled to hope that this terrible scourge will be totally stamped out in a few decades.

ADDENDUM

At the end of 1940 the number of lepers in Sweden had decreased to six.

TABLE I. Experimental Details and Results of Animal Inoculation

Monkey, number and species	Experimental details	Diet	Results	Results of lepromin test
1 <i>Sinicus</i>	June 4, 1938—splenectomized and inoculated intraperitoneally.	Rice, carrots, bananas.	Sept. 9, 1938—killed. Postmortem: Tubercle-like elevation in omentum. Smears from this, liver, and lumbar glands, positive for <i>M. leprae</i> .	Not done.
2 <i>Sinicus</i>	Died during anaesthesia.			
3 <i>Sinicus</i>	June 4, 1938—splenectomized and inoculated subcutaneously. Sept. 14, 1938—reinoculated. Oct. 24, 1938—reinoculated intraperitoneally. Jan. 21, 1939—reinoculated intraperitoneally. July 24, 1939—reinoculated intraperitoneally May 6, 1940—reinoculated intraperitoneally. Jan. 20, 1941—on opening abdomen no omentum was seen. Nodules stitched to parietal peritoneum. June 6, 1942—given lepromin daily to date of death.	Bread, carrots, bananas, nuts.	Dec. 19, 1938—right axillary lymph gland enlarged. Smears negative. Jan. 16, 1939—enlargement of glands disappeared. Mar. 27, 1939—glands both axillae enlarged. Smears negative. Feb. 13, 1941—erythematous patch in inguinal region and lower abdominal wall. Smears revealed various acid-fast rods. Aug. 11, 1941—lesions disappeared. Aug. 24, 1942—paresis of hind limbs. Dec. 4, 1944—died. Postmortem: Visceral smears negative.	June 12, 1939—2 plus Sept. 25, 1939—2 " Oct. 24, 1939—2 " Nov. 20, 1939—2 " Jan. 7, 1940—2 " Mar. 12, 1940—2 " May 31, 1940—2 " Sept. 3, 1940—2 " Nov. 7, 1940—2 " Oct. 13, 1941—2 " Apr. 1, 1942—2 " June 25, 1942—2 " June 22, 1942—positive from this date. From Dec. 14, 1942—no appreciable reaction from that date to death.
4 <i>Sinicus</i>	July 11, 1938—inoculated without splenectomy. Oct. 24, 1938—splenectomized and reinoculated. Spleen smear negative.	Bread, rice, bananas, carrots	Oct. 31, 1938—died. Postmortem: Liver smear showed a few acid-fast bacilli intracellularly. Liver impression smear showed clusters of acid-fast bacilli.	Not done.
5 <i>Sinicus</i>	July 11, 1938—inoculated without splenectomy. November 5, 1938—splenectomized, spleen smear negative, nodule stitched to splenic stump.	Rice, bread, bananas, carrots, milk.	Sept. 5, 1938—nodules felt in the abdomen. Nov. 8, 1939—died. Postmortem: Visceral and marrow smears negative.	Not done.
6 <i>Sinicus</i>	Aug. 22, 1938—inoculated without splenectomy. Nov. 5, 1938—splenectomy attempted but failed due to adhesions. Nov. 28, 1938—splenectomized and reinoculated. Spleen smear negative. May 5, 1939—reinoculated.	Fruits, milk, bread, etc., Jan. 23, 1939 put on <i>C. anti-quarum</i> .	Jan. 2, 1939—lymph nodes both axillae enlarged. Smear negative. Jan. 16, 1939—right axillary glands normal, left still enlarged. June 19, 1939—left axillary glands much larger. Smear negative. Oct. 3, 1939—hind limbs paralyzed. Treated with Betaxin. Oct. 9, 1939—erythematous patch, lower abdomen. Smear revealed solid looking acid-fast bacilli. Feb. 5, 1940—erythema, axilla. Feb. 8, 1940—erythema disappeared. Feb. 27, 1940—died. Postmortem: Skin smear positive. Liver and mesenteric lymph glands smears showed acid-fast bacilli. Culture of visceral emulsion negative.	June 19, 1939—2 plus. Remained positive until 1 month before death.
7 <i>Sinicus</i>	Aug. 22, 1938—splenectomized and inoculated. Nov. 18, 1939—reinoculated.	Fruits, bread, rice, milk, etc.	Oct. 17, 1938—nodule not felt. Dec. 3, 1938—large nodule felt. Nov. 22, 1939—died. Postmortem: No dissemination. Visceral emulsion culture negative.	June 12, 1939—positive. Sept. 25, 1939—doubtful. Oct. 24, 1939—doubtful.
8 <i>Sinicus</i> (Malaria infected)	Oct. 27, 1939—splenectomized and inoculated.	Usual	Dec. 13, 1938—died. Postmortem: No nodules inside abdomen. Blood film showed malarial parasite. Visceral smears negative. Visceral emulsion culture negative.	Not done
9 <i>Sinicus</i>	Jan. 21, 1939—splenectomized and inoculated. July 23, 1939—reinoculated. Oct. 14, 1939—reinoculated. May 6, 1940—reinoculated.	Usual diet. and <i>C. anti-quarum</i> .	Apr. 3, 1939—smears from erythematous patch away from the operational wound showed a few broken acid-fast bacilli and a definite globus in one area. Dec. 4, 1940—died. Postmortem: Smears of erythematous patch on groin, and from nose, ear, and bone-marrow showed a few acid-fast bacilli. Liver, lung, and kidney smears negative. Smears from mesenteric lymph glands showed a few granular acid-fast bacilli. Visceral emulsion culture negative.	June 19, 1939—doubtful. Sept. 25, 1939 to May 31, 1940—2 plus. Sept. 3, 1940—negative.
10 <i>Sinicus</i>	Jan. 21, 1939—splenectomized and inoculated.	Usual	Jan. 25, 1939—died. Postmortem: Visceral smears negative.	Not done.
11 <i>Sinicus</i>	Mar. 6, 1939—splenectomized and inoculated.	Usual	Mar. 8, 1939—died, peritonitis.	Not done.
12 <i>Sinicus</i>	Mar. 6, 1939—splenectomized and inoculated. Mar. 21, 1939—India ink intravenously. June 12, 1939—reinoculated. Sept. 23, 1939—reinoculated. Feb. 21, 1940—reinoculated. Has had 32 courses of 3 injections of 10 cc. of India ink emulsion.	Usual	Aug. 28, 1939—small nodule about the size of a pea felt in the left abdominal wall. Excised, smear did not reveal acid-fast bacilli. Nov. 7, 1940—killed.	July 1, 1939—negative. Oct. 3, 1939—negative. Oct. 10, 1939 to May 31, 1940—doubtful. Sept. 3, 1940—negative.

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5 <i>Sinicus</i>	July 11, 1938—inoculated without splenectomy. November 5, 1938—splenectomized, spleen smear negative, nodule stitched to splenic stump.	Rice, bread, bananas, carrots, milk.	Sept. 5, 1938—nodules felt in the abdomen. Nov. 8, 1939—died. Postmortem: Visceral and marrow smears negative.	Not done.
6 <i>Sinicus</i>	Aug. 22, 1938—inoculated without splenectomy. Nov. 5, 1938—splenectomy attempted but failed due to adhesions. Nov. 28, 1938—splenectomized and re-inoculated. Spleen smear negative. May 5, 1939—re-inoculated.	Fruits, milk, bread, etc., Jan. 23, 1939 put on <i>C. anti-quarum</i> .	Jan. 2, 1939—lymph nodes both axillae enlarged. Smear negative. Jan. 16, 1939—right axillary glands normal, left still enlarged. June 19, 1939—left axillary glands much larger. Smear negative. Oct. 3, 1939—hind limbs paralyzed. Treated with Betaxin. Oct. 9, 1939—erythematous patch, lower abdomen. Smear revealed solid looking acid-fast bacilli. Feb. 5, 1940—erythema, axilla. Feb. 8, 1940—erythema disappeared. Feb. 27, 1940—died. Postmortem: Skin smear positive. Liver and mesenteric lymph glands smears showed acid-fast bacilli. Culture of visceral emulsion negative.	June 19, 1939—2 plus. Remained positive until 1 month before death.
7 <i>Sinicus</i>	Aug. 22, 1938—splenectomized and inoculated. Nov. 18, 1939—re-inoculated.	Fruits, bread, rice, milk, etc.	Oct. 17, 1938—nodule not felt. Dec. 3, 1938—large nodule felt. Nov. 22, 1939—died. Postmortem: No dissemination. Visceral emulsion culture negative.	June 12, 1939—positive. Sept. 25, 1939—doubtful. Oct. 24, 1939—doubtful.
8 <i>Sinicus</i> (Malaria infected)	Oct. 27, 1939—splenectomized and inoculated.	Usual	Dec. 13, 1938—died. Postmortem: No nodules inside abdomen. Blood film showed malarial parasite. Visceral smears negative. Visceral emulsion culture negative.	Not done
9 <i>Sinicus</i>	Jan. 21, 1939—splenectomized and inoculated. July 23, 1939—re-inoculated. Oct. 14, 1939—re-inoculated. May 6, 1940—re-inoculated.	Usual diet and <i>C. anti-quarum</i> .	Apr. 3, 1939—smears from erythematous patch away from the operational wound showed a few broken acid-fast bacilli and a definite globus in one area. Dec. 4, 1940—died. Postmortem: Smears of erythematous patch on groin, and from nose, ear, and bone-marrow showed a few acid-fast bacilli. Liver, lung, and kidney smears negative. Smears from mesenteric lymph glands showed a few granular acid-fast bacilli. Visceral emulsion culture negative.	June 19, 1939—doubtful. Sept. 25, 1939 to May 31, 1940—2 plus. Sept. 3, 1940—negative.
10 <i>Sinicus</i>	Jan. 21, 1939—splenectomized and inoculated.	Usual	Jan. 25, 1939—died. Postmortem: Visceral smears negative.	Not done.
11 <i>Sinicus</i>	Mar. 6, 1939—splenectomized and inoculated.	Usual	Mar. 8, 1939—died, peritonitis.	Not done.
12 <i>Sinicus</i>	Mar. 6, 1939—splenectomized and inoculated. Mar. 21, 1939—India ink intravenously. June 12, 1939—re-inoculated. Sept. 23, 1939—re-inoculated. Feb. 21, 1940—re-inoculated. Has had 32 courses of 3 injections of 10 cc. of India ink emulsion.	Usual	Aug. 28, 1939—small nodule about the size of a pea felt in the left abdominal wall. Excised, smear did not reveal acid-fast bacilli. Nov. 7, 1940—killed.	July 1, 1939—negative. Oct. 10, 1939 to May 31, 1940—doubtful. Sept. 3, 1940—negative.
13 <i>Sinicus</i>	Mar. 6, 1939—20 cc. of India ink intravenously. Mar. 20, 1939—splenectomized and inoculated. Apr. 3, 1939—15 cc. India ink intravenously. Animal collapsed but revived, face black. May 6, 1939—10 cc. of bacillary emulsion ground in Tyrode's solution given intraperitoneally. Has had 36 courses of India ink intraperitoneally.	Usual	May 12, 1939—large lump felt in the hypogastrium. Oct. 2, 1939—nodule not felt. Nov. 8, 1939—killed.	June 26, 1939—negative. Thereafter repeatedly negative.
14 <i>Sinicus</i>	Mar. 20, 1939—splenectomized and inoculated. Apr. 4, 1939—started on India ink. May 5, 1939—re-inoculated. May 6, 1940—re-inoculated. Had had 28 courses of India ink, 17 intravenously and 11 intraperitoneally.	Usual	June 12, 1939—nodules felt. July 17, 1939—nodule hard and fixed to abdominal wall. Aug. 28, 1939—nodule felt in anterior abdominal wall. Excised, smeared. Showed a few acid-fast bacilli. Apr. 10, 1941—erythematous patch groin and lower abdominal wall. July 26, 1941—died. Postmortem: Viscera black, smears negative. A small nodule attached to anterior abdominal wall and intestines, smears from which showed acid-fast bacilli.	June 26, 1939—negative. Sept. 25, 1939—doubtful. Oct. 24, 1939—1 plus Nov. 20, 1939—1 plus. Sept. 18, 1940—1 plus. Nov. 7, 1940—negative.
15 <i>Sinicus</i>	Jan. 29, 1940—spleen retained in subcutaneous pouch. Feb. 17, 1940—inoculated. Mar. 16, 1940—spleen removed. Smears negative. Spleen section showed no acid-fast bacilli. Mar. 25, 1940—potassium iodine, gr. 1 daily, gradually increased to gr. 100 daily.	Usual	On the 5th, 8th, and 10th day after inoculation, spleen smears showed no acid-fast organisms. Potassium iodide did not seem to affect nodule. July 29, 1940—nodule not felt. Potassium iodide stopped. Nov. 10, 1940—died. Postmortem: Visceral skin and marrow smears negative. Culture prepared from ground visceral emulsion negative.	Mar. 12, 1940—negative. May 31, 1940—negative. Sept. 3, 1940—negative. Oct. 13, 1940—negative.
16 <i>Sinicus</i>	Feb. 17, 1940—splenectomized and inoculated. May 22, 1940—re-inoculated. Remnants of old nodule present.	Usual	June 8, 1942—died.	Mar. 12, 1940—negative. Mar. 23, 1940—negative. May 31, 1940—positive on 10th day. Dec. 20, 1940—3 plus. Apr. 1, 1942—2 plus.
17 <i>Rhesus</i>	July 13, 1940—splenectomized and inoculated.	Usual	Sept. 4, 1940—nodule not felt. Nov. 20, 1940—died. Postmortem: Mesenteric lymph glands and kidney smears positive for acid-fast organisms.	July 15, 1940—negative. Sept. 3, 1940—negative.
18 <i>Rhesus</i>	Feb. 28, 1940—splenectomized. July 13, 1940—inoculated.	Nov. 4, 1940—Vitamin C free diet.	Feb. 4, 1941—died. Postmortem: Visceral smears and culture negative.	July 15, 1940—negative. Sept. 3, 1940—negative.
19 <i>Rhesus</i>	Nov. 23, 1940—inoculated without splenectomy.	<i>C. anti-quarum</i>	Nov. 4, 1940—skin smears showed a few stumpy acid-fast bacilli. Nov. 20, 1941—died under anaesthesia. Postmortem: Visceral smears negative.	Sept. 3, 1940—negative.
20 <i>Sinicus</i>	Nov. 25, 1940—splenectomized and inoculated.	Dec. 3, 1940—Vitamin C free diet.	Dec. 14, 1940—died. Postmortem: Visceral and skin smears negative.	Not done.
21 <i>Rhesus</i>	Dec. 9, 1940—inoculated without splenectomy. Aug. 4, 1941—daily lepromin to April 8, 1942. Dec. 1, 1941—re-inoculated. Mar. 20, 1942—re-inoculated. Feb. 20, 1944—daily injection of lepromin from this date to Feb. 2, 1945. Feb. 24, 1945—started on lepromin daily.	Vitamin C free diet.	Aug. 4, 1941—two patches of denuded hair on the back. Ear and nasal smears negative. Oct. 5, 1942—one infiltrated lesion noticed on the center of the forehead. Smear negative. Nov. 11, 1942—lesions between the eyebrows larger and more erythematous. Erythema extends from inside of the thigh, not usual place for erythema in these monkeys. Nov. 16, 1942—lesion on forehead larger, 15 x 16 mm. Dec. 12, 1942—now two lesions on the face. Dec. 17, 1942—biopsy of forehead lesion. Jan. 2, 1943—forehead lesion reappeared. Oct. 26, 1943—one of the lepromin nodules excised and sent to Saidapet. Feb. 14, 1945—forehead lesions persist. Smears from forehead, ear, and thigh negative. Feb. 19, 1945—forehead lesions almost disappeared.	Dec. 20, 1940—negative. Oct. 13, 1941—positive. Nov. 23, 1942—2 plus. Apr. 6, 1942—reaction appears to be enhanced. Apr. 8, 1942—nodules tend to break down and ulcerate.
22 <i>Sinicus</i>	Nov. 25, 1940—inoculated without splenectomy.	Dec. 3, 1940—Vitamin C free diet.	Dec. 3, 1941—died. Postmortem: skin and visceral smears negative. Culture negative.	Negative
24 <i>Rhesus</i>	Dec. 9, 1940—splenectomized and inoculated.	Dec. 29, 1940—Vitamin C free diet.	Apr. 7, 1941—died. Postmortem: skin, visceral, marrow smears negative.	Negative
25 <i>Sinicus</i>	Dec. 5, 1940—splenectomized. Jan. 20, 1941—inoculated.	Feb. 4, 1941—Vitamin C free diet.	Mar. 20, 1941—died. Postmortem: Visceral smears negative. Scrapings from parietal peritoneum in the region of the wound showed granular acid-fast bacilli.	Not done.
26 <i>Rhesus</i>	May 16, 1941—splenectomized. June 15, 1942—inoculated.	Usual	July 6, 1942—nodule felt. Oct. 6, 1943—nodule reappeared.	Oct. 13, 1941—weekly tests negative. June 5, 1943—daily tests negative.
27 Replaced monkey	Aug. 28, 1943—splenectomized and inoculated.	Usual	Still under observation.	Sept. 6, 1943 to Nov. 16, 1943—negative. From Nov. 8, 1943 to May 22, 1943—positive.
28 <i>Rhesus</i>	Nov. 7, 1941—weekly lepromin to Dec. 9, 1941. Feb. 7, 1942—inoculated. Sept. 21, 1942—lepromin daily. Mar. 13, 1943—splenectomized and re-inoculation. Mar. 25, 1943—lepromin daily.	Usual	Feb. 27, 1942—nodule felt. Nov. 16, 1943—nodules measured 8x8 mm. to 5x5 mm. Jan. 8, 1944—died. Postmortem: All visceral smears negative except suprarenal which showed many acid-fast bacilli. Cultures made.	Feb. 27, 1942—negative. Apr. 25, 1942—2 plus.
29 <i>Sinicus</i>	Dec. 1, 1941—splenectomized and inoculated. Feb. 20, 1942—lepromin daily. Oct. 26, 1942—lepromin subcutaneously.	Usual	Aug. 24, 1942—no evidence of the implanted nodule. June 14, 1943—died. Postmortem: Visceral smears negative. Culture made and guinea pig inoculated.	Feb. 20, 1942—negative. Mar. 16, 1942—1 plus. May 5, 1942—2 plus and thereafter 1 plus. Aug. 17, 1942—negative. Feb. 15, 1943—negative.
30 <i>Sinicus</i>	Not splenectomized or inoculated. Nov. 9, 1942—lepromin daily. Apr. 5, 1944—splenectomized and inoculated. Nov. 24, 1945—lepromin daily.	Usual	Under observation.	Negative. April, 1945—positive.
31 <i>Sinicus</i> (malaria infected)	May 31, 1943—lepromin daily Feb. 24, 1944—lepromin daily.	Usual	Under observation.	Negative.
32 <i>Sinicus</i>	May 31, 1943—lepromin daily.	Usual	Under observation.	Negative
33 <i>Sinicus</i>	Sept. 23, 1943—splenectomized and inoculated. Sept. 30, 1943—lepromin injection. Feb. 24, 1945—lepromin daily.	Usual	Under observation.	Jan. 27, 1943—positive. Oct. 25, 1943—slight reaction. Oct. 25, 1943 to Nov. 16, 1943 ± Thereafter reaction varying from questionable to negative.
34 <i>Sinicus</i>	Oct. 30, 1943—splenectomized. Nov. 8, 1943—lepromin.	Usual	Under observation.	Negative.
35 <i>Sinicus</i>	Mar. 6, 1944—started on nodule emulsion intradermally. Repeated several times.	Usual.	July 26, 1944—smear from lesions produced by intradermal injections shows numerous acid-fast bacilli, some in globi. Feb. 11, 1945—died. No postmortem.	Negative.
36 <i>Sinicus</i>	Mar. 6, 1944—started on nodule emulsion intradermally, repeated several times. Mar. 27, 1944—lepromin injection.	Usual.	Jan. 15, 1945—died. Postmortem: Spleen abscess, contents cultured, and spleen sent for section cutting.	Mar. 27, 1944—negative.
37 <i>Sinicus</i>	Mar. 21, 1944—splenectomized. Apr. 6, 1944—started on nodule emulsion intradermally.	Usual.	Aug. 16, 1944—died. Postmortem: Visceral smears negative.	No reaction.
38 <i>Sinicus</i>	Apr. 5, 1944—nodule fixed to omentum. Apr. 6, 1944—started on nodule emulsion intradermally.	Usual.	May 25, 1944—died. Postmortem: Petechial hemorrhages in small gut. Visceral smears negative.	No reaction.