

Outbreak of cholera among convicts : an etiological study of the influence of dwelling, food, drinking-water, occupation, age, state of health, and intercourse upon the course of cholera in a community living in precisely the same circumstances / by Max von Pettenkofer.

Contributors

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OUTBREAK OF CHOLERA
AMONG CONVICTS.





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TRANSLATED FROM
THE REPORT OF THE CHOLERA COMMISSION FOR THE GERMAN EMPIRE

OUTBREAK OF CHOLERA AMONG CONVICTS.

AN ETIOLOGICAL STUDY

OF THE

INFLUENCE OF DWELLING, FOOD, DRINKING-WATER, OCCUPATION, AGE,
STATE OF HEALTH, AND INTERCOURSE

UPON

THE COURSE OF CHOLERA IN A COMMUNITY LIVING IN PRECISELY THE SAME CIRCUMSTANCES,

BY

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CHOLERA COMMISSION OF THE GERMAN EMPIRE.

WITH EIGHT LITHOGRAPHIC TABLES.



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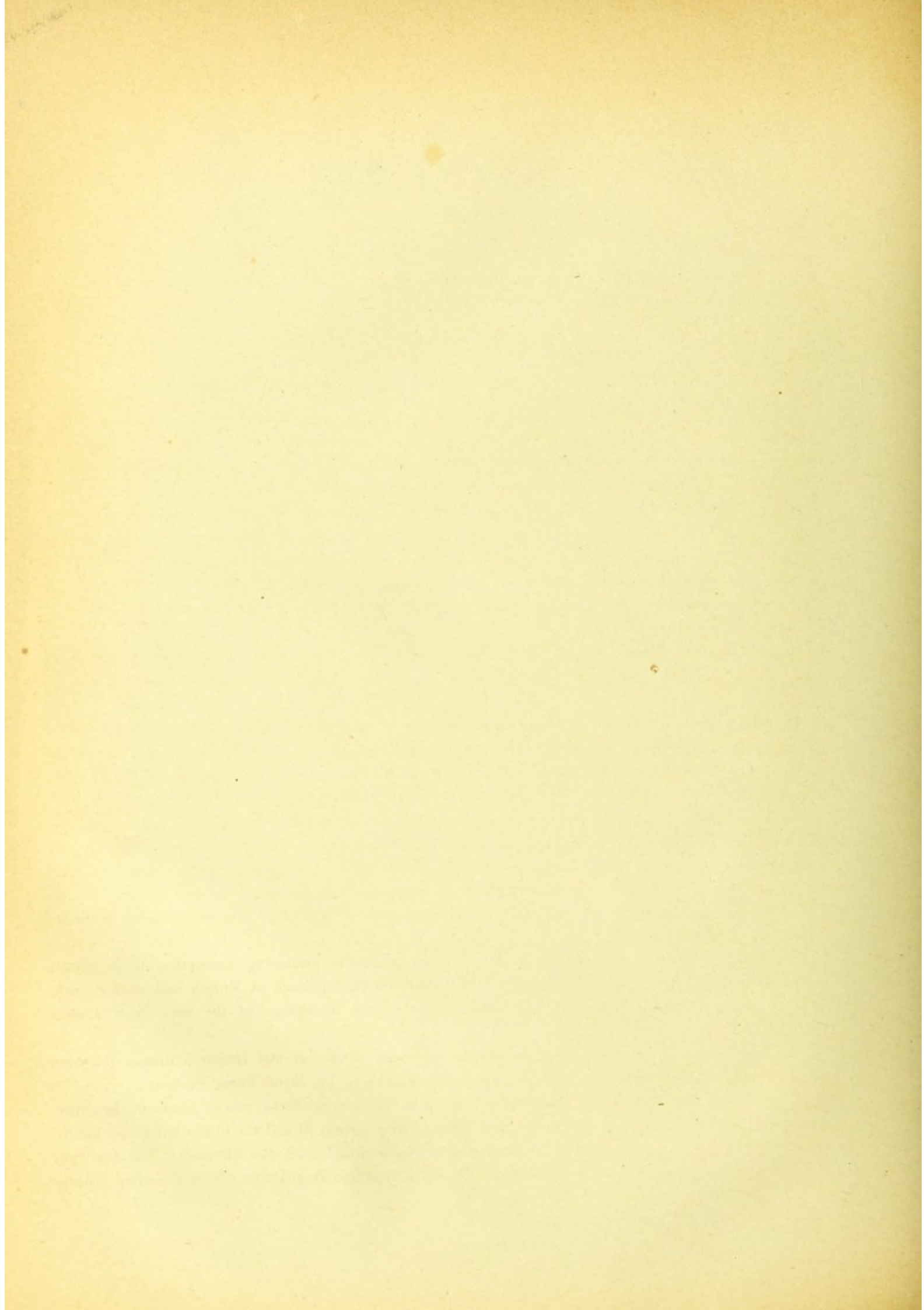
1876.

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INTRODUCTION.

The cholera commission for the German Empire, appreciating the advantages which would accrue from an extremely exact and detailed account of the course of an epidemic among a group of several hundred persons living in almost exactly the same circumstances and in every respect under the most rigid inspection and control, in furthering our knowledge of the mode of distribution of the disease, commissioned me to draw up a report of the outbreak of cholera observed in the Royal Bavarian prison at Laufen on the Salzach in December 1873, which, as regards the number and virulence of the cases, has hardly its equal in the history of cholera in Europe. After I had fulfilled this charge at the third conference of the commission since its appointment, which was held at Berlin from October 12th to October 20th 1874, the commission recommended the publication of the report at the Chancery Office, which the latter ordered to be carried out.

Holding fast to the principle, that the distribution of cholera from place to place is effected by human intercourse, the question, which first forces itself upon our notice, is from where and how the cholera was brought to Laufen.

It could of course come there from all places, where cholera prevailed at the time and with which the penal establishment had any direct or indirect communication. It is true that there were no positive indications of its having had any definite place of origin, although it is a fact that the institution had not such an uninterrupted personal and actual communication with any other place affected with cholera as it had with Munich. It must therefore be accepted as the most probable explanation, that the epidemic of cholera in the prison at Laufen had its origin in the epidemic of cholera at Munich. This view is rendered still more probable by the further fact, that all the Bavarian prisons in which cholera appeared during the year 1873 were those only, to which convicts were regularly removed from Munich. All the other Bavarian prisons, which did not receive their prisoners from or through Munich, remained unaffected by cholera on that occasion.

Under these circumstances it may not be inappropriate to preface my description of the cholera at Laufen with an account of some general facts relative to the epidemic at Munich and some remarks thereon; in doing which I will not anticipate a more minute description of the same from another point of view.

The accompanying card shows the number of cases of cholera and choleroïd disease (choleraic diarrhoea and diarrhoea), as they were daily reported in Munich at the Royal Police Stations.

The first case in Munich is inscribed on June 25th. The person affected was an American clergyman, who had arrived in Munich the day before from Vienna, being already ill and the illness terminated fatally.

The patient was taken from the station to a neighbouring hotel, the Rheinischer Hof and from there to the General Hospital.—The second case affected a merchant from Darmstadt, who arrived likewise

in Munich from Vienna already ill, was also taken from the station first to an adjoining hotel (Schweizer Hof) and soon after from there to the General Hospital, where he recovered.

The next cases now (2 on the 21st, 2 on the 22nd, 1 on July 27th) affected persons, who had never left Munich, who had not visited at least at the time any centre of infection or place affected with cholera, whose infection therefore may be assumed to have had its origin in Munich itself. According to the views commonly entertained we should expect that the first cases occurring in Munich ought to be traced back to the first cases coming from Vienna. An investigation having this object in view gives however a completely negative result. All persons, who had come in contact with the two first cases at the station, in the Rheinischer and in the Schweizer Hof, as well as in the General Hospital, remained unaffected, moreover the above-mentioned institutions and houses, in which these two patients coming from Vienna with the disease already upon them had found admission and gone through with their illness, did not exhibit for weeks after any cases of cholera or diarrhœa, even when the cholera seemed already widely disseminated in the rest of Munich. Nay, the first five cases occurring in Munich happened one and all to persons who had come in no contact whatever with the two patients coming from Vienna or those in their immediate vicinity and moreover in parts of the town exactly opposite to that, in which the station, the two above-mentioned hotels and the General Hospital are situated; one case affecting the wife of a professor at 6 Upper Garten-Strasse, whose infant had died suddenly the day before of acute intestinal catarrh(?), one case, that of a labourer's wife (street hawker) in the suburb Au, 4 Krämergasse, one, that of a labourer in the Au, 5 Durchlass, one in the suburb Giesing, 14 Birkenau. Only in the case in Upper Garten-Strasse could a very far-fetched connection be discovered with an external centre of infection. Namely a visitor from Vienna had been in the house of the professor about a fortnight before the attack, but had remained only 2 hours with the family, was apparently quite well and had not used any water-closet in the house; besides which the physician who was first called to the American clergyman, was also physician to the family of the professor. If we endeavour to trace an infection to this visit of a Viennese, who was apparently quite well and with whom the patient came in only temporary contact, or to the physician, it must appear all the more remarkable, that no infections took place among those in the vicinity of the two cholera patients, who came from Vienna, nor among the numerous patients of the physician. Staff Surgeon Dr. Friedrich has made the first twelve cases of cholera in the last epidemic at Munich the subject of a very comprehensive and minute investigation, but, as appears from his report presented to the Medical Society of Munich, has not found the slightest data for the assumption that the first cases of the epidemic had any connexion with cases of cholera or diarrhœa coming from abroad.

This want of proof occurs very frequently, it may be said regularly, on making a more exact examination into the origin of local epidemics, but it would certainly be wrong to conclude from it, that local epidemics seldom derive their origin from imported cases of cholera, that cholera can spread from place to place even without the influence of human intercourse, that it arises spontaneously; the fact can only warrant the assumption, that the infected persons and the intercourse only with them are not the sole causes at work. A very instructive example on this head has also been furnished by the epidemic which occurred in the town of Heilbron on the Neckar in Wirtemberg in August 1873, of which another member of the commission (Dr. Volz) will shortly furnish a minute report based on a very exhaustive description by the district surgeon Dr. Höring.

I may state here by way of preliminary, that a gymnastic fête took place at Heilbronn in the beginning of August which attracted visitors from a distance, even from Bavaria, where the cholera had already appeared in Munich. The introduction of the cholera was of course apprehended, but the fête passed off without the occurrence of any symptoms. Attention was now principally directed to any passengers who might arrive from Vienna or Munich infected with cholera and who were to be most carefully isolated in a part of the hospital set apart for this purpose. But it was destined to come in another way.

In the night between August 25th and 26th 5 persons were suddenly and almost simultaneously seized with violent symptoms of cholera between 12 and 1 o'clock in a low lying part of the town in different houses at a distance of 80 or 90 paces from each other. These 5 cases had all terminated fatally by noon on August 26th, so that there could not any longer be the slightest doubt that Asiatic cholera had broken out in Heilbron. Neither any connexion of the first cases with patients living elsewhere, nor any personal connexion between the cases themselves could be proved in spite of the most minute investigation, but the presence of cholera in Heilbron notwithstanding manifested itself unmistakably in 5 houses at the same time.

Nor does the further progress of the disease there furnish any proof, that the morbid principle in cholera really proceeds from the infected persons, for if the first case can occur in a house without the presence of a patient affected with cholera, the cases which follow the first case can occur in the same way and it is quite arbitrary to explain the following cases as having been infected by the first patient. The facts connected with the distribution of cholera leave us a certain choice in explaining them between the influence of the locality infected and the influence of the person infected, who is in an infected locality or comes from one. As soon as an infected locality and infected patients coincide, it is indifferent, which of the two agencies are adduced; as soon as they no longer coincide, the question arises: does the active principle originate in the person affected and cling only to the locality? or does it originate in the locality and cling only to the person affected, who can then likewise disseminate it from place to place, in the same way as those who have come in contact with an infected locality when in a state of health? Five other cases occurred up to September 2nd in one of the 5 houses, which had furnished the first cases in the night between August 25th and 26th. The first case must be explained without infection by patients and there is no obstacle to the 5 cases which followed this one being explained like the first. A person who had assisted a female patient until her death in one of the houses first affected, was already attacked on August 27th in another quarter of Heilbron at some distance from this house. It cannot be determined, whether this person was infected by the patient whom she nursed, or whether the nurse suffered from the same cause, as the patient. When once infected localities have been formed and infected localities and infected persons coincide, it is perfectly optional to substitute the one for the other. I shall endeavour to show at the conclusion of my work, that we get involved in far less contradictions, when in explaining the distribution of cholera from place to place through human intercourse we regard the infected locality and not the patient as the centre and view the latter only as the conveyer of something from the infected locality.

The subsequent course of the cholera in Munich from the end of July 1873 to the end of April 1874 contradicts most decidedly the commonly received view, which regards the patient or his evacuations as the principal source or focus of the malady. A glance at the topographical map of Munich shows how rapidly the epidemic began to develop from the end of July. Already 39 cases were recorded on August 11th and 12th. But now a sudden check occurred, during which the epidemic no longer increased in dimensions, and such a marked diminution set in in September, that the last day of this month and the two first days of October passed without any fresh attacks of cholera or allied diseases. During the whole of October only few and sporadic cases occurred with quite free intervals. Only 2 isolated cases occurred in the first 14 days of November, so that no epidemic worth speaking of prevailed after this date.

The cold time of year too having now set in, which is commonly regarded as most unfavourable for cholera, a*) comparison between the different epidemics throughout Germany commencing with the year 1831 showing that the number of cases rapidly declines after October, I entertained the hope, Munich

*) Statistical communications on the course of epidemics of cholera in Prussia. By H. Brauser. With a preface by Dr. Housselle. Berlin. 1862. Hirschwald.

had got over its epidemic at least for this year and the coming winter, although a circumstance occurred during its progress in August and September, which deserves attention as evidencing the fact, that Munich could not in reality have fully received its absolution this time. The most low-lying parts of the town in which the epidemics of 1836 and 1854 had wrought most havoc, were but very little or not at all affected and this always appeared to me a suspicious circumstance, leading me to expect a further outbreak in September and October; as this however had not yet presented itself even up to the beginning of November, I looked upon it as certain, that there would be no more cases of an epidemic character during the winter, although individual cases like those in October might perhaps be continued throughout the whole winter.

I was lulled into this at last certainly treacherous feeling of security principally by two facts. In the first place no case was known to me in the whole history of cholera in North and South Germany, where a place of some importance had exhibited two perfectly distinct epidemics in one and the same year, of which the one had occurred in summer, the other in winter and the winter epidemic had been worse than the summer epidemic. Epidemics extending over a long period have certainly been known, as for instance that at Erfurt in the year 1849, which lasted from May till the beginning of November (Pfeiffer), or epidemics which have visited a town two years running, as for example Halle 1849 and 1850 (Delbrück), but the cold season was always free from them and no summer epidemic had preceded in those places, where the cholera was not developed until the colder season of the year (Munich 1836).

Relying moreover upon the prevalent notions, I attached also great importance to the fact, that there had been no revival of the epidemic in October, although one circumstance led me to anticipate it. House leases are generally taken for half a year in Munich and dwellings are principally changed only at the two so-called terms, Easter (April 24) and Michaelmas (September 29th). This was also the case at Michaelmas 1873. About 5000 families changed their dwellings. Reckoning a family at only 3 persons, this change of dwelling represents a removal of 15000 persons of the population of Munich. Two kinds of forces must now frequently obtain here, both supposed to favour the distribution of cholera: first people moved out of infected districts into districts which had hitherto remained free, where therefore they could introduce the disease and then people moved out of districts, which had hitherto remained free, into infected districts and could therefore be attacked there. The question might have been seriously discussed, whether a sanitary state such as that in which Munich found itself towards the end of September, did not justify the change of habitation being suspended on this occasion and postponed to a later period, when there could no longer be any doubt that it could be carried out without any danger of disseminating the cholera. At all events such a regulation would have been as justifiable as other quarantine regulations, which are directed against cholera. But every interference of this kind in human domestic matters is attended with so much difficulty and has such wide-spreading consequences, that on mature consideration we are soon obliged to refrain from it and leave the affair to take its own course, even at the risk of the mischief being actually brought about by our non-interference.

The result of the change of dwellings in Munich which took place quite in the ordinary way at the Michaelmas quarter 1873 showed however that the apprehension was unfounded and that all the sacrifices which would have been made, would have been undergone without profit. The epidemic did not immediately break out again after the removal, but declined more and more on the contrary until the middle of November. The following change of quarters (Easter), which again exactly coincided with the conclusion of the winter epidemic that had broken out in the meantime, may also be drawn within the circle of this consideration, for the cholera which broke out again in the second half of November 1873 continued until April 28th 1874 and the very considerable change of habitation which took place at Easter 1874 prevented just as little the complete extinction of the disease which now at length resulted, immediately after it as that at Michaelmas 1873 had effected its revival.

If we consider more closely the long-continued winter epidemic of Munich, which contrary to all expectation had broken out in November after a previous summer epidemic, the winter epidemic also can again be distinctly divided into two groups; the first mounts up rapidly from November 15th, already reaches its maximum of 56 cases on December 4th and 8th and again declines considerably towards the end of December. This first division of the winter epidemic prevailed in a very marked degree in the low-lying parts of Munich, which had been spared in such a striking manner during the summer epidemic. We see the disease amply made up for what it had neglected in summer.

The second group of the winter epidemic is formed partly by the continuation of cases in the quarters of the preceding group, partly of cases from other quarters, which had not yet been materially affected in the summer, partly also of cases in quarters, which were already affected in the summer and in which the epidemic broke out anew. A number of houses, which had formed the head-quarters of the epidemic during the summer, strange to say did not present a single case in the winter epidemic, although the change of quarters which resulted in the meantime had been very considerable; thus for instance 137 persons had entered into or removed from 5 such houses.

I can only indicate these interesting and important relations, further particulars it is to be hoped, will soon appear in a minute report by the district surgeon Dr. Frank. I shall occupy myself here only with the occurrence of cases of cholera in the prisons and lock-ups of Munich, from which prisoners were transferred to the prison at Laufen and other Bavarian penal establishments.

The following establishments will be considered here: (I) the Royal Police Prison of Munich (Wein-Strasse), (II) the Public Jail (lower Anger), (III) the Prison for Unconvicted Prisoners (Bad-Strasse), (IV) the District Prison of Munich on the right of the Isar (Lilienberg in the Au), and (V) the Military Prison (Karlsthor).

With the consent of the minister for justice I applied to the various medical officers, who supplied me with the following information respecting the cases of cholera and allied diseases which occurred in the prisons placed under their professional care from August 1st to December 1873.

I. POLICE PRISON.

Dr. Frank, surgeon to the police has sent me the following list:

LIST

of those cases of cholera, which occurred in the arrest-houses of the Royal Police.

1. Knecht Ignaz, had been for some time attendant to turnkey Brerl and predecessor, was taken ill with choleraic diarrhoea at the police-station (Wein-Strasse 13/0) on December 7th and taken to the General Hospital. He is a confirmed dram-drinker and is said to have often had symptoms of *delirium tremens*. At the time of his seizure no case had yet occurred in the lock-up. Recovered.

2. Niederlechner Alois, stocking-weaver, was taken ill in the lock-up (Wein-Strasse 13/I) Room No. 14/1 on January 2nd, was removed to the General Hospital and died there on January 3rd. Had been in confinement from December 29th to January 2nd.

3. Buchner Josef, servant, attacked in the lock-up (Wein-Strasse 13/0) Room No. 1 (under-ground-floor) on January 21st, was taken to the hospital and died there on January 25th. Had been in confinement from January 18th till the morning of the 21st.

LIST

of those cases of cholera, which occurred in the adjoining city goal in Gruft-Strasse.

1. Mangs Andreas, tobacconist, attacked in the city goal, Gruft-Gasse, No. 1/III, Room No. 50/III on October 6th, was immediately removed to the City Hospital and died there on October 7th. He had been 12 days in confinement.

2. Schmidbauer Max, waiter, attacked in room No. 13/00 (No. 24/0 is above this room) on January 8th, was removed to the General Hospital and recovered. He had been 2 days in confinement.

3. Hafner Josef, belt-maker, attacked in room No. 65/II on January 7th, was removed to the General Hospital and died there on January 8th. He had come from Freising on January 4th, was still quite well on the 6th and attacked with diarrhoea from 6th to 7th. Had been in confinement from January 4th to 7th.

4. Præstel Margaretha, maid-servant, attacked in room No. 9/00 (No. 23 is above No. 9) on March 9th; was removed to the General Hospital, where she died on March 13th. Had been in confinement since March 4th.

5. Waibl Johanna, maid-servant, attacked in room No. 25/0 (No. 13/00 is exactly under No. 25/0) on March 10th, was removed to the General Hospital and recovered. Had been in confinement since January 31st.

6. Stegmaier Ignaz, bookbinder, attacked with diarrhoea in room No. 65/II on January 2nd, was removed to the hospital, had an attack of cholera in the night between January 5th and 6th and was reported as affected with cholera on January 6th. He died on January 14th and had been 1½ days in confinement prior to the attack.

7. Brey Joseph, shepherd, attacked with choleraic diarrhoea in room No. 23, ground-floor (No. 9 is under No. 23), on January 10th and was removed to the hospital; recovered. Had been 1 day and 2 nights in confinement.

8. Kœnig Georg, servant, attacked with choleraic diarrhoea in room No. 13, underground-floor (No. 25 is above No. 13), and was removed to the hospital; recovered. Had been in confinement from February 9th to 14th.

9. Marx Emil, compositor, attacked with diarrhoea and spasms in room No. 11, underground-floor, on March 21st and was removed to the hospital. Had been in confinement since February 24th, first 3 or 4 days in No. 35, then in No. 11, where he was taken ill; no case of cholera had hitherto been in either room, No. 35 and No. 11; recovered.

10. Maier Theres, labouring woman, attacked with cholera in room No. 25/0 (No. 13 is under No. 25, and No. 36 above it) on March 24th and was removed to the hospital. She had been in confinement here from March 14th to 24th. Recovered.

II. GOAL FOR UNCONVICTED PRISONERS IN THE ANGERSTRASSE.

Professor Alois Martin, MD., has furnished the following list:

LIST

of the prisoners attacked with cholera in this prison from August 1st 1873 to January 1st 1874.

Order	N A M E .	Day of admission.	When attacked.	Nature of illness.	Where removed or discharged free.	REMARKS.
1.	Zauser Maria, maidservant from Bregenz, æt. 25.	August 1st.	August 19th.	Cholera.	General Hospital.	Brought back again on August 27th.
2.	Lang Johann, labourer of Munich, æt. 39.	August 11st.	August 14th.	Cholera.	ditto.	Brought back again on August 23rd.
3.	Lang Jul. Michl, editor of Munich, æt. 34.	Dec. 4th. gave himself up.	Dec. 8th.	Choleraic diarrhoea.	Discharged free.	Did not return again.
4.	Raming Josef, journeyman tailor of Munich, æt. 30.	Oct. 25th.	Nov. 3rd.	Choleraic diarrhoea.	Professionally treated in the gaol, and discharged cured.	
5.	Oswald Bernhd., butcher from Stefansberg, æt. 28.	Nov. 17th.	Dec. 16th.	Cholera.	General Hospital.	Died on Dec. 18th.
6.	Sölch Andreas, man-servant from Hitzelsberg, æt. 54.	Nov. 22nd.	Dec. 16th.	Cholera.	General Hospital. 6 p. m.	Died Dec. 17th.
7.	Marx Gabriel, shoemaker from Maxfried, æt. 39.	Nov. 8th.	Dec. 22nd.	Cholera.	General Hospital.	Escaped from hospital shortly after removal.

Dr. Martin remarks also that besides the cases of cholera and choleraic diarrhoea an unusually large number of cases of simple diarrhoea were simultaneously observed and treated in the prison, especially in the first half of August and in the second half of November.

III. GOAL FOR UNCONVICTED PRISONERS IN BAD-STRASSE.

Dr. Martins, surgeon to the goal sends the following particulars:

LIST

of the cases of cholera and allied diseases which occurred in the prison in Bad-Strasse in Munich from August 1st to December 1st 1873.

No.	N A M E.	Day and nature of attack.	Duration of imprisonment prior to attack.
1.	Zintel, Babette.	Aug. 20th, Diarrhoea with vomiting.	3 days (imprisoned Aug. 17th).
2.	Hoefner, Franziska	Aug. 25th, " " "	8 days (" Aug. 17th).
3.	Pleiner, Theresa.	Oct. 7th, Cholera. Died.	4½ months (" May 17th).
4.	Wagner, Anna.	Oct. 15th, Acute diarrhoea.	2 months (" Aug. 18th).
5.	Hauser, Adelheid.	Nov. 14th, " " "	1 day (" Nov. 13th).
6.	Fest, Benno.	Nov. 18th, Cholera. Died.	5½ weeks (" Oct. 6th).
7.	Boeckel, Marie.	Nov. 11th resp. 19th, Cholera.	4 resp. 12 days (" Nov. 7th).
8.	Sedelmaier, Martin.	Nov. 20th, Cholera. Recovered.	3 weeks (" Oct. 29th).
9.	Maief, Max.	Nov. 26th, Cholera. Died.	2 months (" Sept. 30th).
10.	Kohlhofer, Franz.	Nov. 26th, Acute diarrhoea.	6½ weeks (" Oct. 7th).
11.	Metzger, Leonhard.	Nov. 26th, " " "	2½ months (" Aug. 9th).

NB. Rosalie Baumann, who was committed to prison on August 23rd and removed to Wasserburg on November 7th 1873, never suffered from diarrhoea, but from cardialgia with occasional vomiting, especially towards the end of October.

IV. PRISON FOR CONVICTED AND UNCONVICTED PRISONERS ON THE RIGHT OF THE ISAR.

District-surgeon Dr. Laval has forwarded the following particulars:

The daily average number of prisoners in the prison on the right of the Isar on the Lilienberg between August 1st and November 30th 1873 was 35.5, among which 3 were females.

	A. Total.	B. Women.	Maximum A.	Minimum A.
August	34	5.8		
September	37.1	2.4		
October	35	1.8		
November	35.8	2.2	48	21

On November 10th 1873 was received into the prison: Maria Hagenburger, æt. 53, wife of a cottager at Haimhausen, in the district of Dachau; she was well when she entered, caught cold whilst in solitary confinement (through opening the windows too late in the evening) and after indulging too freely in cold fat meat, had a severe attack of diarrhoea during one day, was affected with cholera in the night between 17th and 18th, was transported in the afternoon of the 18th to the hospital at Haidhausen and died there on the 20th. The autopsy confirmed the diagnosis.—Nothing was known of there having been a case of cholera in her home before her entrance into the prison.

No other case of cholera occurred among the prisoners or the attendants in the above-mentioned interval.

V. MILITARY PRISON.

Staff-surgeon Dr. Hirschinger sent me the following report:

Military persons under arrest:

1. Gunner Georg Sauer, ill with diarrhoea from August 8th to 19th 1873, under arrest since July 22nd;

2. Private Kasper Gaab, ill with cholera from August 9th to September 20th, arrived here from Ulm on August 4th;

3. Private Xaver Stegmaier, ill with diarrhoea from August 9th to 17th, under arrest since July 9th;

4. Rifleman Martin Sachsenhauser, ill with diarrhoea from August 9th to 17th, under arrest since July 18th;

5. Private Korbin Stocker, ill with diarrhoea from August 12th to 21st, under arrest since August 6th.

The following table gives a comparative view of the cases in each prison:

POLICE PRISON Wein-Strasse.			GOAL Lower Anger.			PRISON in Bad-Strasse.			PRISON on the Lilienberg in the Au.			MILIT. PRISON at Karlsthor.		
ATTACKS.		No. of days in prison.	ATTACKS.		No. of days in prison.	ATTACKS.		No. of days in prison.	ATTACKS.		No. of days in prison.	ATTACKS.		No. of days in prison.
Day.	Illness.		Day.	Illness.		Day.	Illness.		Day.	Illness.		Day.	Illness.	
Dec. 8 1873	Chol. diarrh.	—	Aug. 14	Cholera	19	Aug. 20	Diarrhoea.	3	Nov. 18	Cholera †	8	Aug. 8	Diarrhoea.	18
Jan. 2 1874	Cholera †*)	5	" 19	"	4	" 25	"	8				" 9	Cholera.	6
" 21	" †	4	Nov. 3	Chol. diarrh.	10	Oct. 7	Cholera †	123				" 9	Diarrhoea.	31
			Dec. 8	"	5	" 14	Diarrhoea.	61				" 9	"	23
			" 16	Cholera †	30	Nov. 14	"	1				" 12	"	7
			" 16	" †	25	" 18	Cholera †	39						
Oct. 8 1873	Cholera †	12	" 22	"	45	" 19	" †	12						
Jan. 2 1874	" †	1½	Aug.	Diarrhoea.		" 20	"	21						
" 7	" †	4	Nov.	"		" 26	" †	61						
" 8	"	2				" 26	Diarrhoea.	46						
" 10	Chol. diarrh.	1½				" 26	"	107						
Feb. 14	"	6												
March 9	Cholera †	6												
" 10	"	40												
" 21	Diarrhoea.	26												
" 24	Cholera.	11												

*) Fatal cases are indicated by a cross.

If we consider the prevalence of cholera in the Munich prisons in which unconvicted prisoners were confined, it appears, that with the exception of the military prison they were very little affected by the summer epidemic, suffering for the most part only from the winter epidemic. This circumstance corresponds entirely to their local situation and to the nature of their immediate surroundings.

In those cases, which had been in confinement only a few days, it must be left undecided, whether the infection was contracted in the prison or perhaps outside it.

In the police prison and the adjacent town prison indications of an epidemic influence could strictly speaking be perceived only from January to March 1874, when also the surrounding quarter was affected; the symptoms too in the public goal (Lower Anger) were but faint in August and did not assume a decided character till later. The local epidemic influence was most evident in the prison for unconvicted prisoners in Bad-Strasse, a prison constructed and managed in strict accordance with the cell system and that at the very time when the winter epidemic re-commenced and visited especially that very part of Munich, the so-called Isar suburb, in which Bad-Strasse also is situated. The prison on the right of the Isar, which showed no traces of a house epidemic either in the epidemic of 1836 or in that of 1854 in spite of an imported case, exhibited this time also only one quite isolated case. The prevalence

of cholera in the prison in Bad-Strasse is also of interest in many respects, and we may expect to hear a further account of it from Dr. Martius at some future period. On another occasion I shall have to speak of the striking fact, that no cases of illness occurred in the ante-room at the police-station, which hundreds of prisoners passed through, who were conveyed from and viâ Munich.

The military prison presents a remarkable contrast to the other prisons for unconvicted prisoners at Munich. This prison was involved not only in the summer epidemic, but exhibited 7 cases during the winter epidemic also, which did not happen till after the 1st of December, and are not contained in the above communication. It is situated in the higher part of the town near a brook, and the remaining prisons (especially that on the Anger and in Bad-Strasse) in the lower part. In August there were violent local outbreaks quite in the neighbourhood of the military prison, for example in some houses in Schommergasse, which also did not share in the subsequent winter epidemic. The military prison did not however despatch any prisoners in August to the civil prisons in question, but only 1 in October to the goal at Munich and 1 to the prison at Laufen.

The fact that the civil prisons for unconvicted prisoners at Munich, which despatch convicts to Bavarian prisons in other parts of the country, materially participated only in the winter epidemic, coincides strikingly with the further fact, that the cholera also did not begin to appear in these remote prisons prior to this period, and not at all in the other Bavarian prisons, which did not receive their supplies from Munich.

In the workhouse at Rebdorf near Eichstätt, which is not under the control of the Minister of Justice, but is a police institution under the Minister of the Interior, the first case of cholera affected a man who had shortly before on November 21st been removed from Munich, where he had occupied the police prison. A house epidemic was developed, which lasted until January 7th and gave rise to somewhat more than 30 cases.

A fatal case of cholera took place in the house of correction at Lichtenau on November 25th, the patient being a convict who had come from Munich (Frohnfeste) on November 23rd. There was also a case terminating in recovery on December 8th, the subject a man who had been lodged in the ante-room at the police-station from November 27th to December 5th, and who had arrived in Lichtenau on December 7th. The epidemic was limited to these two imported cases. It is evident that the individual tendency to cholera was not at all wanting at this time as regards the prisoners at Lichtenau, as a convict (Oswald), who was removed to Munich on November 15th to take his trial, was lodged in the goal there, took the cholera there on December 16th and died of it on the 18th.

The first case of cholera in Laufen on November 29th affected a prisoner, who had already been in confinement for 8 months.

Six cases of cholera and 7 of choleraic diarrhoea occurred in the female prison at Wasserburg between December 30th and January 3rd, although strange to say the epidemic did not spread any further.

I will first submit the occurrence of cholera in Laufen to a thorough investigation, and reserve the likewise very interesting but much smaller epidemics at Rebdorf and Wasserburg for a special consideration. I may mention also beforehand as a striking fact, the circumstance, that the cholera could not this time find its way from the prisons for unconvicted persons at Munich into the nearest situated prison, the great goal at Munich, in spite of numerous prisoners having been removed there.

DESCRIPTION OF THE PRISON AT LAUFEN.

The town of Laufen with its 2100 inhabitants is situated at the south-eastern end of the Bavarian table land on a narrow neck of land, in a serpentine bend of the river Salzach, which the latter makes here flowing round the town on its two long sides on a steep decline. The surface declines gradually in

the longitudinal direction of the neck, and still more abruptly so in the transverse direction towards the river. (See map.)

The prison is situated almost at the commencement of the highest part of the town, 14.⁸²⁶ metres above the mean level of the Salzach according to the measurement of the official architect, Mr. Heilmaier.

The town well-sinker gave me his experience of the strata, which are passed through in boring wells. The same strata are found in the highest situated as in the intermediate and lowest parts of the town, only of different thicknesses. A layer of sand more or less thick constitutes the surface for the most part; then follows Alpine gravel (dolomitic limestone) which forms the actual fundament of the town. A thin stony layer succeeds (conglomerate) called Hurt, then again sand and gravel, then once more a hurt, but of much softer consistence than the upper layer. Ground-water collects in and below this, from which the wells derive their supply.

- a. The strata are found to be of about the following thickness in the highest part of the place, outside the town (Zimmermeister):

Sand	1 to 1.3 metres
Pebbles	12 „ 14 „
Hard conglomerate	0.4 „ 0.7 „
Sand and gravel }	1 „ 1.5 „
Soft conglomerate }	
Below this gravel with water.	

- b. In the higher part of the town (Bräuer Barth):

Sand and gravel	10 to 12 metres
Hard conglomerate	0.6 „ 0.7 „
Sand and gravel }	2.5 „ 3 „
Soft conglomerate }	
Gravel with water.	

- c. In the lowest part of the town (Fleischbank):

Gravel	3 metres
Conglomerate	1 metre, including water.

It is generally believed in Laufen, that the water in the excavated wells is simply water filtered from the Salzach, because the height of the water in the wells is evidently influenced by the level of the Salzach. For several reasons I do not consider this view correct, at least not generally so.

When wells rise and fall with the adjacent river, this is still no proof that the water of the river penetrates into the soil, any more than the simultaneous rise and fall of tributary rivers with the main river, into which they discharge themselves, is a proof, that the tributaries receive their water from the main river. It can arise, and in fact generally does arise from the fact, that the main river elevates the height of water in the tributary simply by acting as a dam to it, by which only the passage of water into the main river is impeded, and therefore when the main river rises, the water in the tributary rises also.

If the wells in Laufen are really fed by water from the Salzach, the water in the wells must also have the same composition as the water of the Salzach, which is not the case, as I shall prove later in speaking of the drinking-water of the prison.

Lastly the level of the water in the wells compared with that of the Salzach, so far as this has been ascertained, is against the assumption. Mr. Heilmaier compared the level of the two wells in the prison with the level of the Salzach on the same plane on December 14th 1873, and found the level of the water in the wells 0.4 to 0.6 metre above the level of the Salzach.

It seems to me therefore, that the excavated wells in Laufen like those elsewhere are really fed by the surface drainage, by land-springs, and their height is in reality influenced only by the greater or less stagnation or sluggishness of the Salzach. At all events still further measurements of a greater number

of wells extending over a larger area would be requisite, before the contrary could be maintained. The view, that the wells contain filtered Salzach water, cannot at all events be extended to the two wells in the prison, as the water would have to flow uphill, in order to reach them.

The main building of the present prison was formerly a hunting-lodge and partially the residence of the archbishops of Salzburg, and was built in its present dimensions in the years 1694 to 1702.*) It consisted originally of the prince-bishop's castle and a stable for 58 horses and other premises. The stable was afterwards used for a long time as a salt-magazine. In accordance with a ministerial decree of December 15th 1861 the chateau after having been employed for various purposes, at last as cavalry barracks, was converted into a prison.

The accompanying plans represent its present condition, as it appears after having undergone a tolerably appropriate adaptation to its present uses. Plan No. I, ground-plan, illustrates the situation of the individual parts, its privies, wells, and drains. The out-flow of the superficial drainage and canals is of course in the direction of the Salzach. The ground of the institution is level from the main road to the Salzach, and falls then perpendicularly about 15 metres deep into the river, from which a solid-built protecting wall arises to the level of the base of the building, standing on a framework of stakes and provided with ties and buttresses. The situation commands a magnificent view of Salzburg, the district watered by the Salzach on the south, the opposite Haunsberg, Waidwörth, the town of Laufen itself and its fields and immediate environs. Opposite Laufen, on the Austrian bank of the Salzach, connected with Laufen by a bridge, are situated the places Oberndorf and Altach, which formerly, when Laufen was still the property of the prince-bishop of Salzburg, and afterwards in the possession of Austria, formed a suburb and numbered just as many inhabitants as Laufen.

In adapting the old building to its new functions, the main building — the former chateau — remained unchanged as regards its outer walls and foundations, only a stair-case and all the privies, cess-pools and drains were newly constructed, and besides these only partition-walls changed and removed.

The former stable lying to the north, afterwards salt-magazine and wood-house, was converted into an hospital and church after removal of the vaulted roof, tearing up the floor, washing out and removal of the subjacent earth which was highly impregnated with salpetre, the old walls being considerably elevated, so that there arose a ground-floor and first-floor; only the first-floor was wanting where the church existed, the whole height of the building being devoted to this purpose. Underground apartments were not constructed. The hospital and overseers' rooms, as well as the doctor's surgery are on the ground-floor. The upper story is in reality the store-house, and the rope-makers work there under cover in bad weather. The interval between the church and the main building was filled up some years later with a little cell-prison, which was built up new from the ground. It has an apparatus for hot-water heating (Perkins' system) in the underground-floor, the ground-floor and first story have 16 cells each in two rows, traversed by the usual corridor with sky-light, besides a larger room.

All the essential architectural features of the main building are represented in Plans II to VI, and speak for themselves, so that I have but very little to remark upon them.

Only the west and north sides of the house are provided with underground-floors, the south side not at all, the east side only partially. The drying apparatus is found in the north-east corner of the latter.

The superficial dimensions of the individual rooms, in case it should be found of interest, can easily be ascertained on the plans which are provided with a scale, and the height of the rooms is almost everywhere the same, after deducting the space between the ceiling and floor 3.5 metres. The cubic dimensions of each room can therefore be easily ascertained.

*) See topographical history of the town of Laufen. By Rev. Heinrich Gentner. Published after his decease by Josef Gentner, town-clerk at Laufen. Munich 1863. Expressly copied out of the XXII volume of the Upper Bavarian Archives, which information I owe to the kindness of Mr. Föckerer the mayor.

The arrangement of the privies is best seen in the plans of the upper stories. The institution has partly the tub system, partly the cess-pool system with descending pipes, and the arrangements are the same throughout all the stories. The position of the cess-pools can be seen in the ground-plan I. A cast-iron pipe 0.2 metres in diameter proceeds from each cess-pool (including that for the cell-prison and that for the hospital, which do not belong to the main building) through all the stories, and has a free opening above the roof. This pipe receives lateral pipes in each story in a convenient corner, which come from the individual closets. Thus for instance the pipe coming from the cess-pool on the south side of the main building receives 4 on the ground-floor and just as many in the first, second, and third stories, therefore altogether 16.

The closet-pipe on the north side of the house receives none on the ground-floor, in the first, second and third stories 6 each, or 18 altogether, that likewise on the east side receives pipes from 18 closets.

These privies grouped together round one main pipe are as a rule divided into halves and are accessible to somewhat large adjoining rooms. According to plan IV the privy No. 36 on the first-floor is in connexion for example with the work-room of the tailors No. 38, as well as with the dormitory of the straw-workers No. 32, the privy No. 42 both with the dormitory of the tailors No. 41, and the work-room of the shoemakers No. 45 and No. 46.

The work-rooms and dormitories, which do not enjoy such free access to these privies, make use of wooden tubs, which are then emptied into these privies and cleaned in the court-yard with water, which flows through canals down to the Salzach.

The three large cess-pools of the main building are about 4 metres in diameter and 6 metres in depth, are constructed out of bricks and cement, so contrived that the bulk of the solid matters is separated from the fluids, and are carefully closed at the surface. The fluid matters are removed every week by means of syphons into portable barrels, and the solid matters are taken away in carts every 6 or 8 weeks, and employed as manure on the land belonging to the institution.—What hygienic importance may attach to these architectural arrangements, will be discussed in the course of our investigation.

PREVIOUS SANITARY CONDITION IN THE PRISON AT LAUFEN.

The prison at Laufen, calculated at the time of its erection to hold about 500 prisoners, was opened in the course of the year 1863 and has had the following average number of inmates in the different years which have intervened:

1863	1864	1865	1866	1867	1868	1869	1870	1871	1872	1873
145	315	395	422	418	498	565	532	466	424	403

The average daily number of patients in the hospital among this average number of inmates was according to Dr. Berr:

3	9	10	10	10	10	12	13	9	10	12
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Out of all the prisoners brought to the institution there died in the different years:

3	13	7	10	9	3	5	13	11	11	23
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The attacks and deaths from cholera are not included in the year 1873, in which case the number of deaths in this year would amount to 106.

The year 1873 even independent of the cholera presents the highest mortality.

OUTBREAK OF CHOLERA IN THE PRISON AT LAUFEN AND EXTENT OF THE EPIDEMIC.

Although the Royal Bavarian Prison at Laufen with an average of 500 prisoners had received from July to October 1873 during the period of the cholera epidemic in Munich numerous reinforcements from that city, especially from the goal on the lower Anger, in which two cases of cholera and an unusual number of cases of diarrhoea had already occurred in August, the institution remained notwithstanding free from an epidemic of cholera. A few cases of dysentery and diarrhoea occurred it is true as they did at all times, one man too who had been some time in confinement even dying of cholera after 10 hours illness in August, whilst another who had come a short time before from Aichach via Munich was attacked with choleraic diarrhoea on October 6th; as however these attacks did not occur more frequently than usual at this time of year, when no epidemic of cholera was in the neighbourhood, the institution could in reality be declared free from cholera up to the end of November.

Immediately on the outbreak of cholera in Munich, every effort had been made in all the Bavarian prisons to prevent these institutions becoming infected, without interrupting the committal of prisoners to the prisons for unconvicted persons or penal prisons, or their removal from them. The measures adopted, which consisted essentially in thorough disinfection of the excrements with sulphate of iron, enforced cleanliness, warm clothing, increased hygienic care in general, and then in careful medical inspection of all attacks, especially all cases of diarrhoea, seemed also to be effectual, for with the exception of three prisons for untried prisoners in Munich itself, where a few mild and sporadic cases occurred, the cholera did not find its way during the summer epidemic into the great prisons of the country, which received many reinforcements at that time out of and via Munich.

The following Bavarian prisons for male convicts were those chiefly concerned:

- 1) The Prison at Munich in the Au,
- 2) „ „ at Lichtenau in Mittelfranken,
- 3) „ „ at Kaisheim in Schwaben and Neuburg,
- 4) „ „ at Laufen on the Salzach,
- 5) The Reformatory for juvenile offenders in Niederschönenfeld near Rain on the Danube,
- 6) The Cell-Prison in Nürnberg, as well as
- 7) The Police Prison (Workhouse) in Rebdorf near Eichstätt;

for female convicts:

- 8) The Prison at Wasserburg on the Inn,
- 9) „ „ at Sulzbach in Oberfranken.

The Bavarian Minister of Justice kindly acceded to my request and gave me the following particulars about all the prisoners who were brought to the above-mentioned institutions either out of or via Munich during the period from August 1st to December 16th 1873:

- a. Christian and surnames,
- b. Age,
- c. Trade or occupation in freedom,
- d. Duration of the preceding imprisonment,
- e. Place, where it took place,
- f. Duration of residence in Munich, as well as the prison or lock-up, in which the individual in question was lodged, and if possible the number also of the lock-up,
- g. Lastly the route taken from Munich to the institution and the mode of transport (whether by railway, carriage, or on foot).

During this time there were sent out of and via Munich:

To the Prison at Munich	40
" " " at Lichtenau	61
" " " at Kaisheim	19
" " " at Laufen	128
" " Peformatory at Niederschönenfeld	19
" " Cell-Prison at Nuremberg	7
" " Prison at Wasserburg	11
" " " at Sulzbach	48
total 373	

It will be seen, the institution at Laufen received the largest share. Of the 128 sent there, 43 had been stationed for some time in Munich.

The arrivals were distributed according to time as follows:

in August	
out of and via Munich	out of Munich
36	12
in September	
15	4
in October	
30	11
in November	
42	13
in December	
5	3

Whilst now the 9 Bavarian prisons, to which prisoners were sent from and via Munich, were not at all involved in the summer epidemic, cases of cholera appear pretty simultaneously with the commencement of the winter epidemic in Munich in four of these institutions, but by far the most in the prison at Laufen. Such a sudden and violent outbreak took place there, that it has not its equal in the history of cholera in Europe. Only one case is known to me, the outbreak of cholera in King's County prison New York in the year 1866*) which can be compared to it.

The prisoners who came from the prisons for unconvicted prisoners at Munich were affected by the epidemic as follows:

*) Annual Report of the Metropolitan Board of Health. New York Albany. 1867. p. 379.

Prisoners despatched to the prison at Laufen from August 1st until December 4th 1874.

1) *from the prison on the Unteranger at Munich:*

ARRIVAL IN LAUFEN		FROHNFESTE LOCK-UP		ILLNESS DURING THE EPIDEMIC IN LAUFEN		
Day	Month	Floor	No. of room	Day	Month	Nature of illness
2	August	II	17	—	—	—
2	"	III	17	—	—	—
6	"	III	17	—	—	—
7	"	II	17	—	—	—
9	"	III	12	—	—	—
9	"	III	5	—	—	—
10	"	III	3	—	—	—
11	"	III	5	—	—	—
23	"	III	17	5	Dec.	Chol. diarrhœa.
11	Sept.	II	17	6	"	Diarrhœa.
4	October	I	5	—	—	—
19	"	II	15	—	—	—
19	"	III	5	—	—	—
25	"	III	10	—	—	—
25	"	II	6	—	—	—
26	"	III	5	8	Dec.	Diarrhœa.
29	"	III	4	—	—	—
29	"	II	5	7	Dec.	Diarrhœa.
29	"	II	34	—	—	—
31	"	II	9	20	Nov.	Diarrhœa
2	Nov.	III	17	5	Dec.	Cholera. †
3	"	I	7	4	"	Diarrhœa.
6	"	I	14	—	—	—
7	"	I	16	5	Dec.	Cholera. †
9	"	I	4	—	—	—
9	"	III	17	—	—	—
9	"	I	4	4	Dec.	Diarrhœa.
12	"	III	16	—	—	—
15	"	I	7	24	Nov.	Diarrhœa.
23	"	II	7	10	Dec.	Diarrhœa.
28	"	II	10	28	Nov.	Diarrhœa.
29	"	III	7	1	Dec.	Cholera.
29	"	III	17	6	"	Chol. diarrhœa.
1	Dec.	II	17	—	—	—
1	"	II	13	1	Dec.	Diarrhœa.
4	"	III	17	—	—	—

2) *Prisoners despatched from the prison in Bad-Strasse, Munich:*

2	August	.	41	—	—	—
4	"	.	52	11	Dec.	Diarrhœa.
17	Sept.	.	66	—	—	—
28	"	.	55	4	Dec.	Chol. diarrhœa.
28	"	.	73. 17	3	"	Diarrhœa.

3) *Prisoners sent from the prison on the Lilienberg in the Au:*

4	August	.	17. 11. 2	—	—	—
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4) *Prisoners sent from the military prison at Munich:*

11	October	.	.	—	—	—
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It may appear remarkable that so few of those who arrived in August and up to October 25th were affected by the epidemic compared with those who arrived afterwards, but this is dependent on the fact that the majority of those who first arrived were already discharged again, before the epidemic broke out—for the term of punishment only amounted to a few weeks in many cases.

The following table contains all the cases of diarrhoea, choleraic diarrhoea and cholera which occurred among rather more than 500 prisoners at Laufen from November 20th to December 21st 1873.

D A T E	A T T A C K E D W I T H				D I E D O F *)		
	Cholera	Choleraic diarrhoea	Diarrhoea	Total	Cholera	Choleraic diarrhoea	Total
November 20 . . .	.	.	1	1	.	.	.
" 21 . . .	.	.	3	3	.	.	.
" 23 . . .	.	.	2	2	.	.	.
" 24 . . .	.	.	2	2	.	.	.
" 25 . . .	.	.	4	4	.	.	.
" 26 . . .	.	.	3	3	.	.	.
" 27 . . .	.	.	1	1	.	.	.
" 28 . . .	.	.	2	2	.	.	.
" 29 . . .	1	.	1	2	.	.	.
" 30 . . .	2	.	3	5	1	.	1
December 1 . . .	6	1	6	13	4	.	4
" 2 . . .	4	.	1	5	3	.	3
" 3 . . .	6	.	6	12	5	.	5
" 4 . . .	33	5	18	56	25	.	25
" 5 . . .	35	8	32	75	24	.	24
" 6 . . .	22	3	7	32	12	.	12
" 7 . . .	12	5	3	20	3	.	3
" 8 . . .	5	8	11	24	3	1	4
" 9 . . .	1	5	6	12	1	.	1
" 10 . . .	.	3	10	13	.	.	.
" 11 . . .	.	2	6	8	.	.	.
" 12 . . .	.	2	.	2	.	1	1
" 13 . . .	.	.	1	1	.	.	.
" 14 . . .	.	.	3	3	.	.	.
" 15 . . .	1	.	.	1	.	.	.
" 16 . . .	.	1	1	2	.	.	.
" 20 . . .	.	.	1	1	.	.	.
" 21 . . .	.	.	2	2	.	.	.
Total	128	43	136	307	81	2	83

From the 136 cases of diarrhoea 11 must be deducted, which happened before the outbreak of cholera, and affected persons who were afterwards attacked again by cholera, choleraic and simple diarrhoea. In calculating therefore the percentage of attacks, only 125 cases of diarrhoea and 296 cases of all diseases are accepted. Of the remaining 125 cases of diarrhoea 104 were treated as out-patients, 21 as in-patients.

This list prepared from individual numerical reports differs somewhat apparently from the chief list by the resident physician of all cases of cholera and choleroïd disease clinically treated from November 29th, but only in the fact that Dr. Berr excluding those treated for diarrhoea out of the hospital included only those treated as in-patients in the chief list. In order to make my report quite conformable to that of Dr. Berr, it would have been necessary to make a distinction between cases of diarrhoea treated in and out of the hospital, and also to exclude some cases of relapse. With the consent of the commission I have forborne to make these exclusions, as they would only hinder us in our survey, without making any material change in the general sketch of the epidemic. For the sake of comparison however I subjoin here Dr. Berr's general report.

*) Remark.—The number of fatal cases does not refer to the day, on which death resulted, but to the day of attack.

GENERAL REPORT

on the course of the epidemic of cholera from November 29th 1873 to the last recoveries
on January 5th 1874.

DATE.	Attacked	Cured	Died	Remainder	DATE.	Attacked	Cured	Died	Remainder
1873:									
November 29 . .	1	.	.	1	December 19 . .	.	5	1	65
" 30 . .	4	.	.	5	" 20 . .	.	10	.	55
December 1 . .	7	.	1	11	" 21 . .	.	3	.	52
" 2 . .	5	.	2	14	" 22 . .	.	.	.	52
" 3 . .	5	.	1	18	" 23 . .	.	.	.	52
" 4 . .	38	2	5	49	" 24 . .	.	.	.	52
" 5 . .	47	3	16	77	" 25 . .	.	5	.	47
" 6 . .	27	1	11	92	" 26 . .	.	2	.	45
" 7 . .	17	.	6	103	" 27 . .	.	4	.	41
" 8 . .	16	.	11	108	" 28 . .	.	.	.	41
" 9 . .	10	.	7	111	" 29 . .	.	5	.	36
" 10 . .	2	.	8	105	" 30 . .	.	3	.	33
" 11 . .	6	2	7	102	" 31 . .	.	9	.	24
" 12 . .	2	.	2	102	1874:				
" 13 . .	1	4	.	99	January 1 . . . .	.	.	.	24
" 14 . .	.	10	1	88	" 2 . . . .	.	.	.	24
" 15 . .	1	7	1	81	" 3 . . . .	.	13	.	11
" 16 . .	1	9	2	71	" 4 . . . .	.	5	.	6
" 17 . .	.	.	.	71	" 5 . . . .	.	6	.	.
" 18 . .	1	.	1	71					
Total	191	38	82			.	70	1	
						191	38	82	
						191	108	83	

The resident medical officer Dr. Alois Berr has given me the following information respecting the symptoms held to be diagnostic of the different maladies:

Diarrhœa (white evacuations, 3 or 4 times or oftener in 24 hours) was only considered and denoted — apart from its coincidence with the time of the epidemic — as specific, when accompanied by a state of general nervous depression (Præcordial anxiety, turgescence of the carotid pulse, tinnitus aurium, moderate vertigo) — to distinguish it from gastric affections (dyspepsia), which constitute a permanent object of out-door treatment in about 2 or 3 per cent of the inmates. I hold that the former cases of diarrhœa designated „specific“ are not to be placed outside the circle of epidemic influence; on the other hand they are not in the same category as the clinical i. e. severe attacks, and are generally left altogether out of account, where the subject of observation is not so directly under our eyes as in a penal community.

„The attack was regarded by me as choleraic diarrhœa (epidemic) as soon as vomiting and decline of strength, retention of urine and spasms accompanied the symptom of diarrhœa, and

„as cholera vera or asiatica, as soon as rice-water evacuations, collapse and hoarseness set in.

„I may remark here also, that 36 cases admitted into the hospital as cases of choleraic diarrhœa, during the course of the disease became gradually affected with cholera and 22 of them died.“

The number of inmates in the institution at the time of the epidemic was as follows:

On December 1st 1873 the number of prisoners amounted to 509. During the period between December 1st and 5th, on which day no more prisoners were sent, there had been 11 fresh arrivals and 2 prisoners had returned from transport. So that the whole contingent of prisoners to be taken into consideration during the epidemic amounted to 522.

Of these 522 there were attacked according to the above-mentioned table:

with cholera, simple and choleraic diarrhœa	56.7 per cent
„ cholera	24.5 „
„ choleraic diarrhœa	8.2 „
„ diarrhœa	23.9 „
died	15.9 „

The few facts, which I have communicated here, already suffice to make this epidemic appear a problem well worthy of the most thorough investigation. With the consent of the Bavarian Minister of Justice and the Imperial Chancellor I not only went myself to the spot, where I made a number of inquiries from December 9th to 17th, but I induced the other members of the cholera commission for the German Empire to betake themselves also to Laufen, and convince themselves of the actual facts. I was unwilling in such an important matter to bear the whole responsibility, so that nothing, which might be of service to the investigation, should be neglected or overlooked.

After the commission had held a full meeting at Munich on January 12th 1874 by order of the Imperial Chancellor, and had been made acquainted with the facts by me, as far as I knew them, they went, myself excepted, with the sanction of the Bavarian Minister of Justice to the prison at Laufen on January 15th, made a thorough examination of the institution, discussed many particulars with governor Schicker and Dr. Berr, made some further important inquiries, and commissioned me after their return from Laufen at a meeting at Munich on January 19th to draw up a minute report. If now almost a year elapsed before this report was completed, it is partly due to the comprehensive nature of the task and the necessity of making many supplementary inquiries, partly to my endeavour to furnish a report as exact and comprehensive as possible. This endeavour determined me, not to comprise the cases at Laufen as isolated per se, but as far as possible in connection with others, which involved me in more work, than I had calculated at first, and obliged me to repeatedly trouble many others also with questions and answers.

I shall now try to relate the facts arranged according to certain points of view.

INTRODUCTION OF CHOLERA INTO THE PRISON AT LAUFEN.

However convinced we may be, that the cholera did not arise spontaneously in Laufen, we have had little success in ascertaining the time or the mode of its introduction. It will be perhaps most practical to take the intercourse with Munich as the starting-point of our investigations.

Quite apart from the fact, that the introduction of the disease from Munich was just as possible during the summer epidemic, but did not take place, those prisoners first claim our attention, who were sent to it from Munich several weeks before the outbreak of the malady in the institution, and especially those, who had resided some time in Munich.

These are enumerated in the following table, which presents a list of all the prisoners 18 in number despatched from the goals for untried prisoners in Munich beginning with November 1st.

DAY OF ADMISSION	CHRISTIAN AND SURNAME	AGE	OCCUPATION IN		WORK- ROOM	DORMI- TORY	DAY OF ATTACK	NATURE OF ATTACK	REMARKS
			FREEDOM	PRISON	No.	No.			
Nov. 2	Bernhard, Georg	55	Wheelwright	Brushmaker	11	64	Dec. 5	Cholera	Died
" 3	Eder, Xaver	24	Servant	Spinner	57	99	" 4	Diarrhœa	Bronchitis, Dec. 14
" 6	Schuller, Georg	27	Bricklayer	Shoemaker	45	80	—	—	
" 7	Christlbauer, Xaver	32	Baker	Baker	21	48	Dec. 5	Cholera	Died
" 9	Eibach, Sebast.	28	Tailor	Tailor	38	39	—	—	
" .	Rottenfusser, Ludw.	29	Butcher	Spinner	57	98	—	—	
" 10	Huber, Anton	39	Bricklayer	Glove-maker	57	70	Dec. 4	Diarrhœa	
" 12	Biehler, Joseph	41	Tailor	Tailor	Solitary confinement		—	—	
" 15	Holzmillner, Sebast.	37	Servant	Spinner	Solitary confinement		Nov. 24	Diarrhœa	
" 23	Huber, Albert	19	Shepherd	Spectacle-maker	84	80	Dec. 10	"	
" 24	Pankratz, Joseph	31	Tailor	Shoemaker	45	83	" 6	"	
" 28	Gallecker, Xaver	21	Servant	Straw-worker	Solitary confinement		Nov. 28	"	
" 29	Märkl, Michael	39	Miller	unemployed	—	under arrest	Dec. 1	Cholera	
" 29	Stöb, Joseph	42	Innkeeper	Spectacle-maker	84	98	" 6	Choleraic diarrhœa	
Dec. 1	Kaufer, Xaver	27	Butcher	Spinner.	57	98	—	—	
" 1	Pflüger, Joseph	17	Butcher	Straw-worker	Solitary confinement		Dec. 1	Diarrhœa	
" 3	Gleisner, Max	21	Locksmith	Locksmith	12	64	—	—	
" 4	Keller, Konrad	22	Butcher	Washer	— under arrest		—	—	

Next in order to these come those, 28 in number, who were despatched from other goals for untried prisoners after November 1st, but who travelled via Munich. They remained on an average, only 1 day in Munich and were lodged in the guard-room No. 13 at the Munich Police Station, through which room those prisoners coming directly from Munich had also to pass.

DAY OF ADMISSION	NAME	AGE	OCCUPATION IN		PLACE OF TRIAL	Work- room	Dormi- tory	DAY OF ATTACK	NATURE OF ATTACK	REMARKS.
			FREEDOM	PRISON		No. in the Institution	No. in the Institution			
Nov. 1	Humel, Michael	20	Dairyman	Spinner	Kempton	Solitary confinement		Dec. 4	Diarrhœa	
	Isselhardt, Jacob	35	Shoemaker	Shoemaker	Augsburg	45	83	" 5	Diarrhœa	
	Rankel, Joseph	40	Shoemaker	Shoemaker	Augsburg	45	82	—	—	
	Röhr, Max	23	Labourer	Tinman	Straubing	12	64	Dec. 4	Chol. diarrh.	Diarrh., Nov. 5
" 2	Böck, Xaver	36	Cottager	Basket-maker	Aichach	47	48	" 5	Diarrhœa	
	Klingseisen, Joseph	38	Labourer	Spinner	Weilheim	57	70	" 5	Cholera	Died
" 3	Fredl, Paul	19	Servant	Spectacle-maker	Straubing	Solitary confinement		—	—	
	Gutowsky, Stanisl.	36	Dealer	Tailor	Augsburg	38	97	—	—	
" 4	Stegbauer, Johann	21	Shoemaker	Shoemaker	Straubing	45	80	Dec. 3	Diarrhœa	
" 5	Grüner, Alois	20	Servant	Tailor	"	Solitary confinement		" 5	Diarrhœa	
" 6	Prügelmeier, Jos.	34	"	Tailor	"	38	41	—	—	
	Zöllner, Alois	32	"	Spectacle-maker	"	84	94	Dec. 4	Cholera	
" 7	Mader, Joseph	31	"	Spinner	Augsburg	57	70	—	—	
" 8	Sigl, Michael	54	"	Straw-worker	Straubing	47	32	Dec. 9	Diarrhœa	
	Hackl, Michael	22	Worker in wood	Joiner	Straubing	71	70	" 3	Cholera	Died
	Huber, Dismes	20	Servant	Cleaner	Augsburg	72	98	—	—	
	Süss, Martin	29	"	Shoemaker	Straubing	45	80	Dec. 6	Cholera	Died
	Scheick, Georg	35	Brewer	Shoemaker	Straubing	45	83	—	—	
" 10	Pledl, Joseph	44	Labourer	Spinner	Deggendorf	57	67	Dec. 4	Cholera	Died
	Sturm, Loreuz	23	Servant	Straw-worker	Weilheim	47	32	—	—	
" 11	Leinfelder, Peter	21	Miller	Spectacle-maker	Aichach	84	94	—	—	
" 14	Bauer, Joseph	21	Servant	Tailor	Passau	38	70	Dec. 7	Cholera	
" 15	Maier, Philipp	51	Labourer	Washer	Augsburg	15	97	" 6	Cholera	Died
" 18	Brandstetter, Jos.	48	"	Tailor	Passau	38	83	" 5	Cholera	Died
" 23	Müller, Narziss	45	"	Weaver	Memmingen	58	98	" 5	Cholera	Died
" 26	Heinzle, Jakob	23	"	Straw-worker	Memmingen	72	97	—	—	
" 30	Zettler, Joseph	26	Bricklayer	Tailor	Kempton	38	32	—	—	
Dec. 3	Kornbrust, Jos.	52	Tailor	Tailor	Kempton	38	99	—	—	

A larger number (43) comprises that section of the prisoners despatched to Laufen between November 1st and December 4th, some of whom had come from other provincial prisons without stopping at Munich, whilst others had voluntarily given themselves up in order to undergo their term of punishment. The following table comprises this third portion of fresh arrivals.

DAY OF ADMISSION	N A M E	PREVIOUS ABODE	OCCUPATION IN THE INSTITUTION	WORK- ROOM No. in the Institution	DORMI- TORY	DAY OF ATTACK	NATURE OF ILLNESS	R E M A R K S
Nov. 2	Zeilbeck, Johann	Kelheim	Straw-worker	72	70	—	—	
	Morhart, Michael	Krumbach	Shoemaker	45	83	Dec. 1	Cholera	Diarrhœa, Nov. 28, Died
" 3	Loibl, Johann	Viechtach	Glove-maker	57	99	—	—	
" 4	Ziller, Simon	Freising	Straw-worker	72	97	Dec. 4	Cholera	Died
	Dietl, Joseph	Deggendorf	Spinner	57	99	" 8	Cholera	Died
" 5	Janker, Joseph	Bogen	Straw-worker	47	83	—	—	
" 6	Ziegler, Barthol.	Landshut	Rope-maker	47	98	—	—	
	Bschorr, Joseph	Donaupföhrth	Weaver	58	99	—	—	
	Stadler, Michael	Wolfstein	Spinner	57	98	Dec. 10	Diarrhœa	
" 7	Habrunner, Josef	Vilshofen	Straw-worker	72	70	" 8	Chol. diarrh.	
" 8	Rupprecht, Josef	Kötzting	Spinner	57	67	—	—	
	Kaufmann, Sebastian	Landsberg	Brushmaker	11	64	—	—	
" 9	Geiger, Josef	Mindelheim	in Hospital	—	—	—	—	
	Christl, Alois	Wasserburg	Spinner	57	64	Dec. 10	Diarrhœa	
	Eberle, Pankraz	Schongau	Cleaner	—	98	—	—	
" 11	Vöslauer, Mathias	Traunstein	Spectacle-maker	Solitary confinement.		—	—	
" 13	Kratzer, Michael	Friedberg	Straw-worker	72	70	—	—	
	Völk, Josef	"	"	72	67	Dec. 9	Diarrhœa	
" 14	Liebhart, Franz	Rottenburg	Joiner	71	70	" 2	Cholera	Diarrhœa, Nov. 23, Died
" 15	Retzer, Michael	Pfarrkirchen	Potato-peeler	47	32	" 5	Cholera	Died
	Simon, Georg	Pfaffenhofen	Straw-worker	47	32	—	—	
	Koch, Anton	Miesbach	Farm Labourer	—	67	Dec. 4	Cholera	Died
	Prager, Leopold	Wolfstein	Straw-worker	72	67	" 6	Cholera	
" 16	Feldmaier, Andreas	Pfarrkirchen	Tailor	Solitary confinement.		—	—	
" 18	Fritz, Josef	Pfaffenhofen	Spectacle-maker	84	80	Dec. 10	Diarrhœa	
	Kräml, Josef	Pfarrkirchen	Knitter	57	80	—	—	
" 19	Venus, Simon	Wasserburg	Locksmith	12	64	Dec. 3	Cholera	Died
" 20	Feistle, Josef	Weilheim	Straw-worker	72	97	" 4	Diarrhœa	
" 22	Dallinger, Johann	Munich ?	Shoemaker	45	82	—	—	
" 24	Freidhöfer, Conrad	" ?	"	45	82	Dec. 8	Chol. diarrh.	
" 26	Lumberger, Carl	" ?	Cooper	11	64	" 8	Diarrhœa	
	Lachenmaier, Georg	Augsburg	Joiner	71	70	" 5	Cholera	Died
" 27	Huber, Georg	Pfarrkirchen	Straw-worker	72	97	—	—	
" 28	Schmidbauer, Seb.	Landshut	"	47	32	Dec. 4	Cholera	Died
" 30	Weichsel, Albert	Munich ?	Joiner	71	70	" 6	Cholera	Died
Dec. 2	Wagner, Gottlieb	Zusmarshausen	Rope-maker	47	98	" 7	Cholera	
	Wagner, Josef	"	Spinner	57	70	—	—	
	Wagner, Mathias	"	Spectacle-maker	84	94	—	—	
" 3	Ober, Josef	Erding	Straw-worker	72	70	—	—	
	Heckengruber, Josef	Eggenfelden	Washer	15	56	—	—	
	Rieblinger, Josef	Augsburg	"	15	56	—	—	
	Asen, Sebastian	Freising	"	15	56	—	—	
" 4	Kinader, Johann	Pfarrkirchen	"	15	56	—	—	

The first subject of investigation with respect to these three divisions is, when and in what number cases of cholera, choleraic and simple diarrhœa appeared among them, and then to compare them with the cases which occurred throughout the whole population of the prison.

With regard to the period of attack no difference is observed between these three divisions, they were very uniformly implicated in the course of the epidemic from November 29th to December 10th, and

in no wise took the lead, so that it would seem as if it was not they who had infected the establishment, but that like the older inmates they had become first infected within it. The cases of diarrhoea (21) observed in the establishment in November 1873 were rather more numerous than usual, but did not show any special preference for the recent comers over those who had been already some time in confinement. No case of cholera appeared among them before December 1st, even the cases of diarrhoea did not occur more frequently among them till after this time. The majority of those, who came via Munich (27) and other places (43), presented only 3 cases of diarrhoea (Mohrhardt, Liebhart and Böck) before December 1st, and even the 18 sent from the goals for untried prisoners in Munich exhibit only 2 cases of diarrhoea before December 1st, namely Holzmüller, who arrived on the 15th but was not taken ill till November 24th, and Galleker, who was already suffering from diarrhoea when he came from Munich, and was placed at once in solitary confinement, and consequently did not come into any contact at all with the other prisoners.

Moreover the amount of sickness and mortality in these three divisions presented no essential difference in the course of the epidemic from the average amount among the other prisoners.

Of the 18 persons constituting the first division there were attacked with:

Cholera	2, of whom 2 died
Choleraic diarrhoea	2
Diarrhoea	7
<hr/>	
total 11.	

Of the 28 persons constituting the second division there were attacked with:

Cholera	9, of whom 7 died
Choleraic diarrhoea	1
Diarrhoea	5
<hr/>	
total 15.	

Of the 43 persons constituting the third division there were attacked with:

Cholera	11, of whom 7 died
Choleraic diarrhoea	2
Diarrhoea	6
<hr/>	
total 19.	

If we calculate the percentages of these numbers, and compare them with those which obtain for the whole prison population, we have the following result:

NATURE OF DISEASE	FIRST DIVISION	SECOND DIVISION	THIRD DIVISION	MEAN OF THREE DIVISIONS	TOTAL INMATES OF PRISON
Cholera	11.1	32.1	25.5	24.7	24.5
Choleraic diarrhoea . . .	11.1	3.5	4.9	5.6	8.2
Diarrhoea	38.8	17.9	13.9	20.2	23.9
<hr/>					
Total	61.1	53.5	44.3	50.5	56.4
<hr/>					
Deaths from cholera	11.1	25.0	16.4	17.9	15.9

The section of the 522 prisoners, numbering 89, comprising those who arrived in the establishment between November and December 4th, presented no material points of difference during the course of the epidemic from the whole number, of which it formed about $\frac{1}{6}$. The greatest deviations occurred in

the first division, but as the smallest absolute numbers obtained here, less weight can be placed upon them. The larger the numbers of the three divisions become, the more nearly their percentage approximates that of the whole number of inmates.

A striking circumstance presents itself pretty uniformly in the three divisions, when we dissect them into three parts, the first comprising the arrivals from November 1st to 14th, the 2nd those from the 15th to 29th, the day of the first case of cholera, and the 3rd those from the latter date to December 4th, and see how many attacks took place in the course of the epidemic.

A. From November 1st to 14th.

	FIRST DIVISION	SECOND DIVISION	THIRD DIVISION	THREE DIVISIONS TOGETHER
Number of persons	8	22	19	48
Cases of cholera	2	6	4	12
Cases of choleraic diarrhoea . .	—	1	1	2
Cases of simple diarrhoea . . .	2	5	3	10

B. From November 15th to 29th.

Number of persons	6	4	15	25
Cases of cholera	—	3	5	8
Cases of choleraic diarrhoea . .	1	—	1	2
Cases of simple diarrhoea . . .	5	—	3	8

C. From November 30th to December 4th.

Number of persons	4	2	9	15
Cases of cholera	—	—	2	2
Cases of choleraic diarrhoea . .	—	—	—	—
Cases of simple diarrhoea . . .	1	—	—	1

There were attacked in the first division

4 of the 8 persons who arrived in section A
 6 " " 6 " " " " " B
 1 " " 4 " " " " " C

There were attacked in the second division

12 of the 22 persons who arrived in section A
 3 " " 4 " " " " " B
 — " " 2 " " " " " C

In the third division there were attacked

8 of the 19 persons who arrived in section A
 9 " " 15 " " " " " B
 2 " " 9 " " " " " C

According to these tables the new arrivals in the establishment during the fortnight which preceded the outbreak of cholera seem to have borne the brunt of the malady. The numbers are here also far too small to enable us to draw any definite conclusions from them, although it is still a remarkable fact, that those who arrived after the outbreak of the epidemic and whilst it was still raging, should have been so slightly affected by it. Of the 15 new arrivals in the interval C only 3 were attacked during the different stages of the epidemic, whilst not less than 18 of the 25 who arrived in the interval B were attacked, and the majority of them with the more acute form. The circumstance is all the more striking in the preceding case, since of the 15 new-comers in section C, 5 were at once drafted off to the

washing department, and not a single one of these 5 newly arrived washers took the disease, although the department of washers, as I shall show afterwards, did not suffer less than the others.

Another fact was observed, which proves still more distinctly even than the foregoing, that admissions at least into the main building of the establishment after the epidemic had already broken out, did not bring that danger, that might have been supposed. The little cell-prison, destined mostly for juvenile offenders, whom it is desirable to withdraw from the bad influences of the common prison, adjoins the main building. There where 35 prisoners undergoing solitary confinement in it at the time of the

(continued, p. 24.)

LIST

of prisoners placed in solitary confinement who were removed to the common prison on December 4th 1873.

Numerical order	N A M E	AGE	OCCUPATION IN PRISON	No. of dormitory	DAY OF ATTACK	NATURE OF ATTACK	R E M A R K S
1	Albert, Johann	20	Spectacle-maker	94	—	—	
2	Bauer, Max	18	"	94	—	—	
3	Fredl, Paul	18	"	94	—	—	
4	Lang, Josef	19	"	94	Dec. 11	Diarrhœa	treated as out-patient
5	Meller, Josef	18	"	91	Dec. 11	Diarrhœa	treated as out-patient
6	Schöllhammer, Anton	19	"	94	—	—	
7	Vöslauer, Matth.	18	"	94	—	—	
8	Ruissinger, Jos.	20	"	94	—	—	
9	Birkmeier, Anton	23	"	94	—	—	died of Typhus on January 1 st 1874
10	Bedacht, Franz	17	Locksmith	64	—	—	relaxed bowels on Dec. 29 th
11	Lorenz, Ferd.	22	"	64	Dec. 15	Diarrhœa	treated as out-patient, as on Nov. 20 th
12	Grüner, Alois	18	Tailor	97	—	—	
13	Hebenspreger, Michael	19	"	64	Dec. 16	Diarrhœa	treated out of hospital
14	Danzer, Georg	39	"	39	—	—	
15	Deierl, Josef	19	"	41	—	—	
16	Feldmeier, Andr.	25	"	98	—	—	
17	Obermeier, Franz	20	"	39	—	—	
18	Wiespauer, Korb	16	"	39	Dec. 4	Choleraic diarrh.	
19	Bichler, Josef	41	"	39	—	—	
20	Böhm, Josef	22	Shoemaker	83	Dec. 6	Diarrhœa	treated out of hospital
21	Staufer, Max	17	"	80	—	—	
22	Bachmeier, Max	17	Straw-worker	70	Dec. 6	Diarrhœa	treated out of hospital
23	Drakolitsch, Jesef	19	"	70	Dec. 5	Diarrhœa	treated out of hospital
24	Pflügler, Josepf	17	"	70	Dec. 1	Diarrhœa	treated out of hospital from Dec. 1 st to 10 th , came from Munich on Dec. 1 st
25	Gallecker, Xaver	20	"	70	Dec. 10	Diarrhœa	suffering from diarrhœa on arrival from Munich on Nov. 28 th , taken ill again on 10 th and treated in hospital
26	Schratzenstaller, Franz	35	"	70	—	—	
27	Hummel, Michael	19	Spinner	32	Dec. 4	Diarrhœa	treated as out-patient
28	Östermeyer, Jos.	19	Straw-worker	70	—	—	
29	Holzhauser, Franz	18	"	70	—	—	
30	Scheuerer, Ferd.	56	Gardener	67	Dec. 11	Diarrhœa	treated in hospital
31	Sandner, Andr.	17	Straw-worker	70	Dec. 4	Cholera	died on Dec. 8 th
32	Seeholzer, Ludw.	18	Shoemaker	80	—	—	
33	Klotz, Ignatz	23	Weaver	98	Dec. 6	Cholera	
34	Altmann, Josef	—	—	—	—	—	placed in a cell for another complaint.
35	Gross, Michael	20	Gardener	67	—	—	slept only in the building for solitary confinement, occupied during the day in the open air, later in room 67. Discharged on Dec. 4 th and continued well afterwards.

outbreak of the epidemic began so unexpectedly to assume such large dimensions on the 3rd of December and especially in the night between December 3rd and 4th, space had to be procured for the patients. It seemed most appropriate to occupy the whole building for solitary confinement as a hospital. The prisoners located there had to be distributed among the other inmates in the common prison, where there happened to be room, which was done early on December 4th. As now empty places had arisen principally through attacks of cholera and cases of death, it is of great importance to notice the distribution of the cell-prisoners, who may be regarded as hitherto free from cholera, among the general body of prisoners already affected with cholera in the main building, as well as what happened to these new comers as it were. Governor Schieker and Dr. Berr have given me the necessary details on this head. (See table page 23.)

The distribution of the cell-prisoners and the number of attacks among them was as follows in the individual dormitories:

No. of Dormitory	32	39	41	64	67	70	80	83	91	94	97	98
No. of new-comers	1	4	1	3	2	8	2	1	1	8	1	2
Cases of cholera	—	—	—	—	—	1	—	—	—	—	—	1
„ „ choleraic diarrhoea	—	1	—	—	—	—	—	—	—	—	—	—
„ „ diarrhoea	1	—	—	2	1	4	—	1	1	1	—	—

Consequently among all the prisoners here in question, who were removed into the main building from an out-building hitherto free from cholera just at the worst time, there occurred only 2 cases of cholera, 1 with fatal issue, 1 of choleraic diarrhoea, 1 of diarrhoea treated in the hospital, and 10 of diarrhoea treated as out-patients. —

The removal took place early on the morning of the 4th. The first cases, which presented themselves in the course of the day among those removed, were one of diarrhoea (the spinner Hummel), one of choleraic diarrhoea (the tailor Wiespauer), and one of cholera, the patient being the straw-worker Sandner, a strong young man aged 18, who had already been 9 months in prison. He was removed to the hospital from the dormitory No. 70 shortly before midnight in the night between December 4th and 5th, when he already presented well-marked symptoms of cholera. If it is here assumed, that he was not already infected when he left his cell, which is not probable for other reasons, but that he became infected only on entering the dormitory No. 70 early in the morning, the period of incubation in this fatal case can only have lasted somewhat more than 15 hours. Why the only fatal case should affect one of that section of the 34 prisoners in solitary confinement, which was placed in dormitory 70, a plausible reason will be given hereafter, when I shall discuss the course of the disease in the establishment relative to dormitories. It was this very dormitory No. 70, which furnished the most numerous and the severest cases. Sandner seems then to have found in one part of the room just a sufficient residue of infecting matter, whilst the remaining 7 prisoners in solitary confinement, who were simultaneously removed with Sandner to the same room, all escaped with slight diarrhoea, or had no illness at all.

The assumption, that at the time, when the removal of the cell-prisoners took place, although at this very time most attacks occurred, yet the main building no longer acted so perniciously on new-comers as it had done a few days before, as well as the assumption, that the mild cases also among those removed did not proceed from their former residence in the cells, but were caused rather by their afterwards entering the sphere of infection in the main building, finds some further support in the period when diarrhoea broke out among this group of 34 persons. Whilst the cases of diarrhoea had reached their maximum in general on December 4th and 5th and then quickly declined, we remark only 3 out of

the 11 cases of diarrhoea observed among the cell-prisoners occurred between November 29th and December 5th, the majority not till after this day, and 6 of them after December 10th. Of 118 cases of diarrhoea which were observed among all the inmates of the prison between November 29th and December 21st, 67 occurred before December 5th and 51 after this date, only 24 more after December 10th, which is about a fifth or 20 per cent of all, whilst in the case of those removed from solitary confinement about half or 50 per cent occurred during the last-mentioned period.

The fact that the great majority of the cases which occurred among those removed were of such a mild character, that the cases of cholera amounted to only 3 per cent, whilst they constituted in general 25 per cent, we might be tempted to attribute to individual disposition or idiosyncrasy and especially to the circumstance that the majority were young men between 18 and 22, — but a comparison we shall subsequently make of the occurrence of cases of cholera in prisoners of the same age undergoing common imprisonment will show, how little protection against cholera was afforded by youth, as soon as certain localities came in question.

Before entering upon the discussion of the first cases of cholera, I will give another glance at the cases of diarrhoea which preceded them from November 20th to the 28th, which might possibly be precursors of the epidemic, and see, whether they predominated among individuals, who had arrived in the establishment only a short time before, and had possibly already brought the germ of the disease with them and then distributed it, or whether among such, as had already been some time in confinement.

The cases of diarrhoea, which preceded the outbreak of cholera on November 29th from November 19th to 28th, affected the following prisoners.

Day of Attack	N A M E.	Duration of Imprisonment	Occupation	Dormi- tory No.	R E M A R K S
Nov. 19	Adlhoch	7 weeks	Tailor	32	
	Ziegler	2 months	Spinner	32	
" 20	Lorenz	2 "	Locksmith	Solitary	Attacked again with diarrhoea on December 12th after removal to common prison
" 21	Maier	5 "	Spectacle-maker	94	
	Fuhreisen	4 ¼ "	Rope-maker	98	Attacked with cholera on December 5th
	Müller	1 ½ years	Weaver	99	
" 23	Andre	5 months	Joiner	70	" " cholera on December 4th and died
	Liebhart	10 days	Joiner	Hospital	" " cholera on December 2nd and died
" 24	Gassner	5 months	Rope-maker	98	" " choleraic diarrhoea on December 8th
	Holzmüller	10 days	Spinner	97	
" 25	Baumgartner	10 months	Weaver	99	" " cholera on December 4th and died
	Berger	2 "	Shoemaker	83	
	Brunbauer	2 "	Joiner	70	" " cholera on December 4th and died
	Göberle	3 "	Straw-worker	Hospital	" " choleraic diarrhoea
" 26	Mumhofer	4 "	Washer	56	" " cholera on December 1st
	Greiner	6 "	Joiner	70	" " cholera on December 4th and died
	Höss	3 "	Straw-worker	32	" " diarrhoea on December 8th
" 27	Reischl	5 "	Weaver	97	" " choleraic diarrhoea on December 1st
" 28	Mohrhardt	26 days	Shoemaker	Hospital	" " cholera on December 1st and died
	Enzensberger	1 month	Shoemaker	86	" " diarrhoea on December 4th

Ten of these 20 cases of diarrhoea (Adlhoch, Lorenz, Maier, Fuhreisen, Müller, Gassner, Göberle, Mumhofer, Reischl and Mohrhardt) were treated in the hospital, — 10 (Ziegler, Andre, Liebhart, Holzmüller, Baumgarten, Berger, Brunbauer, Greiner, Höss and Enzensberger) were treated as out-patients.

Gallecker, who came from Munich on November 28th with diarrhoea, is not included, because he

was placed at once in solitary confinement, where he remained until the morning of December 4th, when he was removed to room No. 70 as dormitory and room 72 as workroom, where he again fell ill on December 10th and was treated in the hospital for diarrhœa until December 16th.

It would seem that almost all the cases of diarrhœa, which could be regarded as the immediate forerunners and importers of cholera, were observed in persons, who had already been at least two months in confinement, with only two exceptions, viz Holzmüller and Mohrhardt, the former of whom had come from Munich 10 days before the attack, but without any symptom of illness. Holzmüller had been 8 months in the prison for unconvicted prisoners on the Anger in Munich and related, that he had already suffered from an attack of diarrhœa before his removal to Laufen. He slept in the establishment in No. 97 and worked in No. 57. As however the diarrhœa did not manifest itself until 10 days after his arrival in Laufen, this can hardly be regarded as an imported case, but it seems more natural and reasonable to seek the cause of its origin in the establishment itself, even if it was already a case of cholera-diarrhœa.

Mohrhardt arrived in the establishment on November 2nd, and did not come either from or via Munich. He was placed with the shoemakers, and removed to the hospital on account of gastricism on Nov. 28th. He was discharged cured on the 30th, but returned again with cholera on December 1st, and died on December 2nd. He is therefore properly enumerated among those who were infected in the hospital, two fatal cases having occurred in the hospital on the same day, in whose vicinity Mohrhardt had been lying.

Neither can the majority of the 20 cases of diarrhœa from November 19th to 28th be regarded as active precursors of cholera, because they participated in the subsequent course of the malady just as much as those prisoners, who had not yet suffered from diarrhœa. Only 6 remained free afterwards, 9 had cholera, 2 choleraic diarrhœa and 3 a second attack of diarrhœa. Six of the 9 cases of cholera terminated fatally. Of those treated for diarrhœa between November 20th and 28th there were attacked again

on December 1st,	2	with cholera,	1	with choleraic diarrhœa,
"	"	2nd,	1	"
"	"	4th,	4	" 1 with diarrhœa,
"	"	5th,	2	"
"	"	8th,	1	choleraic diarrhœa, 1 with diarrhœa,
"	"	12th,	1	diarrhœa,

the temporary rythm of the epidemic in this group is therefore not essentially different from that in all the groups, it is neither much in advance of nor behind it.

Twenty cases of diarrhœa in more than one week among more than 500 prisoners, of which only half required hospital treatment, is an event, which often occurs even without the cholera being near, and perhaps only accidentally coincides also in the present case with the epidemic of cholera which followed it.

Dr. Berr informed me of all the gastric attacks from August to December 1873. In the whole month of November 45 attacks of this kind happened, among them 13 cases of diarrhœa treated in and 16 out of the hospital, consequently altogether 29. Of these 3 occurred before the 19th and 6 after November 28th. During the whole of October there were only 14 gastric cases, 5 of them cases of diarrhœa, which required treatment, on the contrary in the previous September there were 21 gastric attacks, including 8 cases of diarrhœa. The latter were however accompanied by a great number of cases of scurvy in September, of which about 13 cases were treated in and 53 out of the hospital. There were only 9 gastric disorders in August 1873, including 5 cases of diarrhœa.

Dr. Berr has taken the trouble to investigate the occurrence of gastric affections and diarrhœa during the months from August to November in the year 1872, the following figures being the result of

his investigation, leaving out of account the 6 cases of diarrhœa which happened in November 1873 after the outbreak of cholera:

TIME	AVERAGE NUMBER OF PRISONERS		NUMBER OF CASES OF			
			Gastric affection		Diarrhœa	
	1872	1873	1872	1873	1872	1873
August . .	358	490	17	9	6	5
September			14	21	5	8
October . .			26	14	8	5
November			18	39	4	23
Total			75	83	23	41

In the preceding years 1870 and 1871 the numbers from August to November were.

August to November	1870	1871	1870	1871	1870	1871
	519	438	71	56	18	15

From this it is evident, that the number of gastric attacks and more particularly cases of diarrhœa had undoubtedly already increased considerably in November 1873 as compared with the preceding years, and this may be supposed to be a forerunner of cholera, but this increase bears no comparison whatever to that which obtained even in cases of diarrhœa after the outbreak of cholera, as is evident from the table given at page 16, where 50 cases of diarrhœa occurred in only 2 days (December 4th and 5th), or more than as many again as had happened in the whole month of November.

THE FIRST CASES OF CHOLERA.

The first cases of cholera also furnish no clue or evidence to support the assumption of a distinct introduction at a certain time or through a certain person. The first case on November 29th was that of Joseph Roskopf, aged 22, an unmarried servant, who had been 8 months in prison. He was one of the weavers and winders, 36 in number, who all worked together in room 58 on the second floor, but with the exception of two, who were lying ill in the hospital, slept in 8 different rooms, most being in the rooms Nos. 97, 98 and 99 on the third floor. Roskopf slept in No. 99. He went into the hospital with choleraic diarrhœa on the day in question, but soon passed into the cold stage of cholera, recovered from it and was discharged cured on December 15th. His state of health was robust on being admitted into the institution. In April 1873 he had been treated in the hospital for rheumatic fever, and in September he was also under medical treatment as an out-patient for scorbutic symptoms.

The second case on November 30th was that of Nicolaus Maier, aged 31, an unmarried brazier, who had been a year in confinement. He was placed in the establishment with the blacksmiths and locksmiths, who 20 in number worked altogether in No. 12 on the ground-floor and slept in No. 64 on

the second floor. He was at once seized with symptoms of cholera, but recovered likewise, after having passed through the typhoid stage, and was discharged cured on January 4th 1874. His state of health was also robust on his admission into the establishment, and he had always remained well.

The third case (also on November 30th) was that of Jakob Ettl, aged 31, an unmarried brick-layer, employed as straw-worker during his one year and 5 months imprisonment. The straw-workers formed an important part of the establishment, being 88 in number, and worked principally in 2 rooms, 51 in No. 47 on the first floor, and 32 in No. 72 on the second floor, and slept in the rooms Nos. 32 and 48 on the first floor, No. 70 on the second floor and No. 97 on the third floor. Ettl worked in No. 47 and slept in No. 48. Besides straw-work he and 11 others, mostly feeble and decrepid subjects, were employed in peeling potatoes. He died on December 2nd in the cold stage of cholera. The state of health of Ettl on his admission into the institution was tolerably good (scrofulous), he was treated in the hospital for gastric disorder in April, for intermittent fever (with clonic spasms) in May, for a scrofulous affection of the neck in July.

The 6 additional cases of cholera and 1 of choleraic diarrhoea which occurred on December 1st were distributed as follows:

The 6 patients affected with cholera, 4 of whom died, were:

Märkl, in lock-up, came from Munich on this day with diarrhoea.

Mayerhofer, joiner, workroom 71, dormitory 70, died.

Mohrhardt, shoemaker, in hospital for gastric disorder since November 26th, died.

Mumhofer, washer, workroom 15, dormitory 56.

Weinhofer, joiner, in hospital for tuberculosis and erysipelas of face, died.

Zötter, weaver, in hospital for Bright's disease, died.

Reischl, shoemaker, workroom 45, dormitory 80.

The following cases of diarrhoea occurred on this day:

2 from workroom 84, dormitories 91 and 94,

1 " " 45, " 83,

1 " " 15, " 56,

1 in the cell-prison, the subject a new comer from Munich (Pflügler).

COURSE OF THE EPIDEMIC OF CHOLERA IN THE INSTITUTION.

The first acute maladies (cholera and choleraic diarrhoea) exclusively affected persons, who either slept, or were occupied during the day in the east wing of the main building, or were lying in the hospital, the cases of diarrhoea also were most prevalent in the above-mentioned part of the main building.

The shoemakers' workshop No. 45 is situated on the first floor in the middle of the east wing above the smiths' workshop No. 12 on the ground-floor, the dormitory of the joiners No. 70 on the second floor, and directly adjoining it their workshop No. 71.

The straw-workers' workroom No. 47 is situated at the southern corner of the wing, next to it the dormitory No. 48, above on the second floor another straw-workers' room No. 72, and above this on the third floor dormitory No. 99, from which the first case of cholera proceeded.

The hospital must be taken as a second primary focus of infection.

Only the two parts of the building mentioned above (east wing of the main building and hospital) and no other parts were concerned in the first 10 acute cases, and the further course of the epidemic has also shown, that the disease committed the greatest havoc also in the spot where it began.

In order to be able to institute investigations as to the local distribution of cholera in the

establishment and solve further questions connected therewith, it is above all things necessary to separate all the 522 prisoners into groups corresponding to their respective workrooms and dormitories. The working departments to which the prisoners belonged form a natural and lucid basis for both.

SEPARATION OF THE PRISONERS INTO GROUPS CORRESPONDING TO WORKROOMS AND DORMITORIES.

As a basis for statistical comparisons and investigations we can employ the tabular statement prepared by Dr. Berr with the assistance of the superintendent Herr Schicker and the different overseers to meet the wishes of the members of the cholera commission of the German Empire after their visit to Laufen, and which gives information as to the name, age and occupation of each of the 522 prisoners, duration of imprisonment, workroom and dormitory, their state of health on being admitted into the establishment, date and nature of illness in the institution. December 1st was taken as the fixed starting-point. Four of these tables may be given here by way of illustration:

Register-No.	NAME	Age	Trade		No. of		Duration of imprisonment	State of health on admission	Date of attack in establishment		Nature of illness	REMARKS
			out of the establishment	in the establishment	Workroom	Dormitory			Day	Month		
2175	Ingerl, Mich., single	41	Sadler	Shoemaker	45	80	6 mos	Fair	2	June 1873	Scurvy	treated as out-patient
									3	Dec. 1873	Diarrh. & Colic	treated as out-patient
									7	Dec.	Cholera died	of asphyxia
2057	Forstner, Georg, single	41	Servant	Nurse	Hospit.		8 mos	Robust				was 2nd hospital attendant before, during and after the epidemic
2317	Holzhauser, Jos., single	21	Carpenter	Joiner	71	70	4 mos	Robust	4	Dec.	Cholera died	(exhaustion)
1984	Achatz, Andreas, single	73	Labourer	Straw-worker	47	32	9 mos	Feeble Hernia Cataract Marasmus senilis	6	Dec.	Chol. diarrhœa then Cholera	already frequently punished with imprisonment
									11	Dec.	cured	but continued to be on books as invalid

To prepare check and properly arrange these 522 tabular statements was of course a laborious and troublesome work; it was however carried out with all perseverance and conscientiousness. I should not like to assert, that no mistake at all is to be found in the tables, and that one could not be detected here and there, but in general they may be regarded as correct, and it only remains for me to express the thanks of the commission to all those who have cooperated, and particularly to Dr. Berr and Governor Schicker.

I can also myself guarantee the correctness of the number of the dormitories of all patients treated in the hospital up to December 15th. As it was already evident during my presence in Laufen, that the locality was of some importance in the epidemic in the prison, I requested Governor Schicker to allow me personally to check the reports of the dormitories of those attacked, the workrooms were besides not doubtful. The prisoners not under medical treatment were all despatched to the dormitories. Accompanied by the governor I made the round of all the dormitories, called out the names and register numbers in

question, and was shown the bed, which the patient in question occupied before his illness. Partly the statements of the overseers, who were likewise present, partly the statements of the prisoners, especially those in the next beds were taken as evidence, where the patient had slept. I cannot forbear remarking here, that all the statements in the list comprising 190 individual cases delivered to me by the governor and surgeon were already so correct, that only 4 corrections were necessary. I am sorry that I noted down at the time only the dormitories and not also the position of the individual beds in each case. I shall hereafter make a communication, which makes it appear very desirable, that this also should be done in future cases.

DIVISION OF THE PRISONERS

in the Establishment at Laufen according to Occupation, Workrooms and Dormitories.

OCCUPATION	No. of		OCCUPATION	No. of	
	Workroom	Dormitory		Workroom	Dormitory
1 in lock-up	Lock-up		2 Writers	50	48
4 Bakers	21	48	21 Joiners	71	70
95 Spectacle-makers			2	Hospital	
2 in	84	80	42 Shoemakers		
32 "	"	91	19	45	80
56 "	"	94	1	46	80
3 "	"	98	3	46	82
2 "	Hospital		6	45	82
1 Bookbinder	57	70	11	45	83
12 Brushmakers	11	64	2	Hospital	
20 Farm Labourers			22 Ropemakers		
19	out of doors	67	1	mostly out of doors	97
1		64	21		98
4 Gardeners	"	67	36 Spinners and Knitters		
3 Domestic Servants			2	57	32
2	—	48	1	"	56
1	—	67	1	"	64
6 Glove-makers			3	"	67
2	57	56	3	"	70
2	"	70	1	"	80
2	"	99	13	"	97
7 Cooks	20	48	9	"	98
1 Basket-maker	47	48	3	"	99
2 Hospital attendants	Hospital		88 Straw-workers		
1 sick new-comer	"		45	47	32
3 Lithographers	50	48	1	46	32
4 Cleaners			6	47	48
1	—	97	1	50	48
3	—	98	24	72	70
1 Barber	—	70	8	72	97
1 Joiner	11	64	3	Hospital	
20 Blacksmiths and Locksmiths	12	64	26 Washers		
63 Tailors			16	15	56
3	38	32	10	15	97
30	"	39	36 Weavers and Winders		
20	"	41	1	58	56
2	"	64	2	"	67
1	"	67	2	"	82
2	"	70	1	"	91
1	"	83	10	"	97
2	"	97	7	"	98
1	"	98	11	"	99
1	"	99	2	Hospital	

The foregoing table prepared with the assistance of the tabular reports gives us an insight into the distribution of the prisoners according to occupation, workrooms and dormitories. The prison for solitary confinement has found no place in it, and for this reason, because the prisoners in solitary confinement were removed on December 4th, before the epidemic had attacked its victims, and as already mentioned, in order to obtain space for the hospital, the prisoners in solitary confinement were distributed about among the other prisoners, and are entered under those occupations, workrooms and dormitories, to which they were assigned on this occasion. I refer the reader for other particulars to the table on this subject communicated at page 23.

These remarks naturally lead to the consideration, how many individuals in the individual departments of work were attacked by cholera, choleraic and simple diarrhoea. This comparison can be taken as a measure both of the influence, if any, of occupation as well as that of the workroom or locality, both which influences are inseparable.

The 27 departments quoted in the preceding table, and which have certainly very different numerical values (from 1 to 95) were affected in the following manner.

ATTACKS AND DEATHS ARRANGED ACCORDING TO OCCUPATION.

OCCUPATION	Cholera	Choleraic diarrhoea	Diarrhoea	Death
1 in Lock-up	1	—	—	—
4 Bakers	1	—	1	1
95 Spectacle-makers	20	9	27	9
1 Bookbinder	—	—	—	—
12 Brush-makers	4	1	5	4
20 Farm-labourers	3	1	2	2
4 Gardeners	1	—	1	1
3 Domestic Servants	1	—	1	—
6 Glove-makers	3	—	—	2
7 Cooks	1	—	2	1
1 Basket-maker	—	—	1	—
2 Hospital Attendants	—	—	—	—
1 Sick new-comer	—	—	—	—
3 Lithographers	—	—	—	—
4 Cleaners	—	—	—	—
1 Barber	1	—	—	1
1 Cooper	—	—	1	—
20 Blacksmiths & Locksmiths	5	2	3	2
63 Tailors	10	6	17	5
2 Writers	—	—	—	—
21 Joiners	11	—	3	11
42 Shoemakers	10	3	18	7
22 Rope-makers	3	6	7	2
36 Spinners	9	1	6	9
88 Straw-workers	24	9	14	14
26 Washers	5	2	7	4
36 Weavers	15	3	6	8
522	128	43	125	83

As however the workrooms, in which the prisoners spend the greater part of the day, are not the only element to be considered, supposing the morbid infection is more or less prevalent in certain

localities, but the dormitories, in which the prisoners, far more crowded together than in the workrooms, have to pass the whole night, are at least of equal importance, it is necessary to examine the relation of attacks to dormitories. The two following tables serve for this purpose, the first of them giving a summary comparison from this point of view, whilst the second table (Page 33) dissects the attacks in each dormitory into the several departments of labour found in it.

I. SUMMARY COMPARISON OF THE ATTACKS AND DEATHS IN THE SEVERAL DORMITORIES.

Dormitory	Number of Prisoners	Cholera	Choleraic Diarrhœa	Diarrhœa	Deaths
32	51	14	6	9	7
39	30	3	2	9	2
41	20	4	3	5	1
48	26	5	—	6	4
56	20	4	2	2	3
64	37	9	4	11	6
67	30	10	2	3	7
70	52	17	2	10	15
80	23	5	1	7	4
82	11	2	1	6	1
83	12	3	1	8	2
91	33	5	6	10	1
94	56	14	2	16	7
97	45	11	2	11	9
98	44	9	8	7	6
99	17	7	—	5	3
Hospital	14	5	1	—	5
Lock-up	1	1	—	—	—
	522	128	43	125	83

(See Table, Page 33)

ARRANGEMENT OF THE ATTACKS IN THEIR CHRONOLOGICAL ORDER OF SUCCESSION IN THE WORKROOMS AND DORMITORIES.

I have prepared the tables given at pages 34—37 in order to present a general view of the attacks occurring in the individual workrooms and dormitories as regards their order in point of time. I have divided the individual cases according to the grades of attacks; cholera, choleraic diarrhœa, and simple diarrhœa. Each case is entered under the category of the above-mentioned forms of disease with the number of the day of the attack. The cases which ended in recovery have a point beside the number of the day, those which terminated fatally a cross. When for instance the list of spectacle-makers is sought for in the first table (Pages 34, 35), it is found in the first column, that there were 95 of them altogether. In columns 2 and 3 is seen their distribution in the several dormitories, and in the 3 following columns, how many of them were attacked on each individual day in each dormitory with cholera, choleraic and simple diarrhœa. As almost all the cases occurred in December, and comparatively few in November, the plain figures always denote days in December, the attacks on days in November

are indicated by an oblique stroke, and the figure 11 being placed after them. The first case of cholera with fatal result among the 56 spectacle-makers occurred in dormitory 94 on December 3rd (3†), 4 cases follow on December 4th, 2 of them with fatal result. A case of diarrhoea already appeared on November 21st (21/11)

Precisely the same system of signs is employed in the second table which is arranged in relation to dormitories. (Pages 35. 36. 37.)

II. RELATION OF THE ATTACKS AND DEATHS TO DORMITORIES AND DEPARTMENTS OF WORK.

	Cholera	Choleraic diarrhoea	Diarrhoea	Deaths		Cholera	Choleraic diarrhoea	Diarrhoea	Deaths
First Floor.					Third Floor.				
Room 32: 3 Tailors	—	—	2	—	Room 80: 2 Spectacle-makers	—	—	2	—
2 Spinners	1	—	1	1	20 Shoemakers	5	1	5	4
46 Straw-workers	13	6	6	6	1 Spinner	—	—	—	—
51	14	6	9	7	23	5	1	7	4
Room 39: 30 Tailors	3	2	9	2	Room 82: 9 Shoemakers	2	1	5	1
Room 41: 20 Tailors	4	3	5	1	2 Weavers	—	—	1	—
Room 48: 4 Bakers	1	—	2	1	11	2	1	6	1
2 Domestic Servants	—	—	—	—	Roem 83: 1 Tailor	1	—	—	1
7 Cooks	1	—	1	1	11 Shoemakers	2	1	8	1
1 Basket-maker	—	—	1	—	12	3	1	8	2
3 Lithographers	—	—	—	—	Room 91: 32 Spectacle-makers	5	6	9	1
2 Writers	—	—	—	—	1 Weaver	—	—	1	—
7 Straw-workers	3	—	2	2	33	5	6	10	1
25	5	—	6	4	Room 94: 56 Spectacle-makers	14	2	16	7
Second Floor.					Room 97: 1 Cleaner	—	—	—	—
Room 56: 2 Glovers	—	—	—	—	2 Tailors	—	—	1	—
1 Spinner	—	—	—	—	1 Rope-maker	—	—	—	—
16 Washers	4	2	1	3	13 Spinners	—	1	1	—
1 Weaver	—	—	1	—	8 Straw-workers	4	—	3	2
20	4	2	2	3	10 Washers	1	—	6	1
Room 64: 12 Brushmakers	4	1	5	4	10 Weavers	6	1	—	6
1 Farm Labourer	—	—	—	—	45	11	2	11	9
1 Cooper	—	—	1	—	Room 98: 3 Spectacle-makers	1	1	—	1
20 Blacksmiths and Locksmiths	5	2	3	2	3 Cleaners	—	—	—	—
2 Tailors	—	1	1	—	1 Tailor	—	—	—	—
1 Spinner	—	—	2	—	21 Rope-makers	3	6	6	2
37	9	4	11	6	9 Spinners	2	—	1	2
Room 67: 19 Farm Labourers	3	1	2	2	7 Weavers	3	1	—	1
4 Gardeners	1	—	1	1	44	9	8	7	6
1 Domestic Servant	1	—	—	—	Room 99: 2 Glovemakers	2	—	—	1
1 Tailor	1	—	—	1	1 Tailor	—	—	—	—
3 Spinners	3	—	—	3	3 Spinners	1	—	2	1
2 Weavers	1	1	—	—	11 Weavers	4	—	3	1
30	10	2	3	7	17	7	—	5	3
Room 70: 1 Bookbinder	—	—	—	—	Hospital:				
2 Glove-maker	1	—	1	1	2 Permanent Attendants	—	—	—	—
1 Barber	1	—	—	1	1 Ulceration of Foot	—	—	—	—
2 Tailors *)	1	—	—	—	1 Glossitis (Spectacle-maker)	—	—	—	—
19 Joiners	9	—	3	9	1 Abscess of Hand "	—	—	—	—
3 Spinners	2	—	—	2	1 Erysipelas of Face (Joiner)	1	—	—	1
24 Straw-workers	3	2	6	2	1 Carbuncle "	1	—	—	1
52	17	2	10	15	1 Gastric disorder (Shoemaker)	1	—	—	1
					1 Oligæmia "	—	—	—	—
					1 Emphysema of Lung (Straw-worker)	1	—	—	1
					1 Marasmus "	—	1	—	—
					1 Inflammation of Eye-lid "	—	—	—	—
					1 Bright's Disease (Weaver)	1	—	—	1
					1 Tonsillitis	—	—	—	—
					14	5	1	—	5
					Lock-up: 1 Weaver	1	—	—	—

*) One of these tailors (Carl Gallier) was in Kempten from November 23rd to December 3rd during the transport.

CHRONOLOGICAL DISTRIBUTION OF THE ATTACKS.

a) in relation to occupation.

OCCUPATION	No. of Dormitory	No. of Occupants	CHOLERA	CHOLERAIC DIARRHŒA	DIARRHŒA
1 in Lock-up	Lock-up		1.	—	—
4 Bakers	48	4	5†	—	20.
95 Spectacle-makers	80	2	—	—	10. 10.
	91	32	4† 4. 5. 5. 8.	5. 7. 8. 8. 9. 10.	1. 3. 4. 5. 5. 5. 5. 11. 11.
	94	56	3† 4† 4† 4. 4. 5† 5† 5† 5.	6. 9.	21/11. 27/11. 1. 3. 3. 4. 5. 5.
			5. 5. 6. 7. 8†		5. 5. 5. 6. 8. 9. 11. 14.
	98	3	5†	6.	—
	Hospital	2	—	—	—
1 Bookbinder	70	1	—	—	—
12 Brushmakers	64	12	4† 5† 5† 5†	4.	3. 4. 4. 4. 6.
20 Farm-labourers	64	1	—	—	—
	67	19	4† 4. 7†	5.	5. 5.
4 Gardeners	67	4	4†	—	11.
3 Domestic Servants	48	2	—	—	—
	67	1	15.	—	—
6 Glove-makers	56	2	—	—	—
	70	2	6.	—	4.
	99	2	5† 6.	—	—
7 Cooks	48	7	6†	—	3. 10.
1 Basket-maker	48	1	—	—	5.
2 Hospital Attendants	Hospital	2	—	—	—
3 Lithographers	48	3	—	—	—
4 Cleaners	97	1	—	—	—
	98	3	—	—	—
1 Barber	70	1	5†	—	—
1 Cooper	64	1	—	—	8.
20 Locksmiths	64	20	30/11. 3† 4† 5. 5.	4. 9.	20/11. 7. 8.
63 Tailors	32	3	—	—	5. 8.
	39	30	2† 4† 7.	4. 11.	4. 4. 5. 5. 5. 5. 6. 7. 8.
	41	20	3. 4. 5. 6†	4. 7. 7.	4. 4. 5. 6. 9.
	64	2	—	7.	16.
	67	1	4†	—	—
	70	2	7.	—	—
	83	1	5†	—	—
	97	2	—	—	5.
	98	1	—	—	—
	99	1	—	—	—
2 Writers	48	2	—	—	—
21 Joiners	70	19	1† 3† 4† 4† 4† 4† 5†	—	30/11. 1. 5.
			5† 5†		
	Hospital	2	1† 2†	—	—
42 Shoemakers	80	20	2. 3† 6† 6† 6†	9.	2. 3. 5. 9. 13.
	82	9	6. 7†	8.	30/11. 4. 5. 5. 5.
	83	11	4. 5†	5.	1. 4. 4. 5. 6. 7. 10. 10.
	Hospital	2	1†	—	—
22 Rope-makers	97	1	—	—	—
	98	21	4† 5. 7.	6. 7. 8† 8. 8. 16.	4. 4. 5. 5. 8. 10.

(cont.)

CHRONOLOGICAL DISTRIBUTION OF THE ATTACKS.

a) in relation to occupation.

OCCUPATION	No. of Dormitory	No. of Occupants	CHOLERA	CHOLERAIC DIARRHŒA	DIARRHŒA
36 Spinners and Knitters	32	2	3†	—	4.
	56	1	—	—	—
	64	1	—	—	10.
	67	3	4† 4† 9†	—	—
	70	3	4† 5†	—	—
	80	1	—	—	—
	97	13	—	5.	24/11.
	98	9	4† 6†	—	10.
	99	3	3†	—	23/11. 4.
88 Straw-workers	32	46	4† 4† 5† 5† 5. 5. 6. 6. 6. 7. 7. 8† 8.	4. 4. 5. 5. 10. 12†	30/11. 4. 8. 8. 9. 11.
	48	7	30/11† 4. 6†	—	9. 21.
	70	24	4† 5. 6†	5. 8.	1. 5. 6. 9. 10. 11.
	97	8	2† 4† 5. 6.	—	4. 4. 10.
	Hospital	3	4†	5.	—
26 Washers	56	16	4† 6† 6† 6.	9. 11.	29/11.
	97	10	7†	—	4. 8. 8. 8. 10. 14.
36 Weavers and Winders	56	1	—	—	5.
	67	2	7.	10.	—
	82	2	—	—	6.
	91	1	—	—	—
	97	10	5† 5† 5† 5† 6† 6†	1.	—
	98	7	5. 6. 6.	12.	—
	99	11	29/11. 4† 7. 7.	—	5. 5. 6.
	Hospital	2	1†	—	—

CHRONOLOGICAL DISTRIBUTION OF THE ATTACKS.

b) with reference to dormitories.

Dormitory No.	OCCUPANTS	CHOLERA	CHOLERAIC DIARRHŒA	DIARRHŒA
32	3 Tailors	—	—	5. 8.
	2 Spinners	3† (formerly in room 99)	—	4.
	46 Straw-workers	4† 4† 5† 5† 5. 5. 6. 6. 6. 7. 7. 8† 8.	4. 4. 5. 5. 10. 12†	30/11. 4. 8. 8. 9. 11.
	51			
39	30 Tailors	2† 4† 7.	4. 11.	4. 4. 5. 5. 5. 6. 7. 8.
41	20 Tailors	6† 4. 5. 3.	4. 7. 7.	4. 4. 5. 6. 9.
48	4 Bakers	5†	—	20.
	2 Domestic Servants	—	—	—
	7 Cooks	6†	—	3. 10.
	1 Basket-maker	—	—	5.
	3 Lithographers	—	—	—
	2 Writers	—	—	—
	7 Straw-workers	30/11† 4. 6†	—	9. 21.
26				

(cont.)

CHRONOLOGICAL DISTRIBUTION OF THE ATTACKS

b) with reference to dormitories.

Dormitory No.	OCCUPANTS	CHOLERA	CHOLERAIC DIARRHŒA	DIARRHŒA
56	2 Glove-makers	—	—	—
	1 Spinner	—	—	—
	16 Washers	4† 6† 6† 6.	9. 11.	29/11.
	1 Weaver	—	—	5.
	20			
94	12 Brushmakers	4† 5† 5† 5†	4.	3. 4. 4. 4. 6.
	1 Farm-labourer	—	—	—
	1 Cooper	—	—	8.
	1 Spinner	—	—	10.
	20 Locksmiths	30/11. 3† 4† 5. 5.	4. 9.	20/11. 7. 8.
	2 Tailors	—	7.	16.
	37			
67	19 Farm-labourers	4† 4. 7†	5.	5. 5.
	4 Gardeners	4†	—	11.
	1 Domestic Servant	15.	—	—
	1 Tailor	4†	—	—
	3 Spinners	4† 4† 9†	—	—
	2 Weavers	7.	10.	—
	30			
70	1 Bookbinder	—	—	—
	2 Glove-makers	6.	—	4.
	1 Barber	5†	—	—
	2 Tailors	7.	—	—
	19 Joiners	1† 3† 4† 4† 4† 4† 5† 5† 5†	—	30/11. 1. 5.
	3 Spinners	4† 5†	—	—
	24 Straw-workers	4† 5. 6†	5. 8.	1. 5. 6. 9. 10. 11.
	52			
80	2 Spectacle-makers	—	—	10. 10.
	20 Shoemakers	2. 3† 6† 6† 6†	9.	2. 3. 5. 9. 13.
	1 Spinner	—	—	—
	23			
82	9 Shoemakers	6. 7†	8.	30/11. 4. 5. 5. 5.
	2 Weavers	—	—	6.
	11			
83	1 Tailor	5†	—	—
	11 Shoemakers	4. 5†	5.	1. 4. 4. 5. 6. 7. 10. 10.
	12			
91	32 Spectacle-makers	4† 4. 5. 5. 8.	5. 7. 8. 8. 9. 10.	1. 3. 4. 5. 5. 5. 5. 5. 11. 11.
	1 Weaver	—	—	—
	33			
94	56 Spectacle-makers	3† 4† 4† 4. 4. 5† 5† 5† 5. 5. 5. 6. 7. 8†	6. 9.	21/11. 27/11. 1. 3. 3. 4. 5. 5. 5. 5. 5. 6. 8. 9. 11. 14.
97	1 Cleaner	—	—	—
	2 Tailors	—	—	5.
	1 Rope-maker	—	—	—
	13 Spinners	—	5.	24/11.
	8 Straw-workers	2† 4† 5. 6.	—	4. 4. 10.
	10 Washers	7†	—	4. 8. 8. 8. 10. 14.
	10 Weavers	5† 5† 5† 5† 6† 6†	1.	—
	45			

(cont.)

CHRONOLOGICAL DISTRIBUTION OF THE ATTACKS

b) with reference to dormitories.

Dormitory No.	OCCUPANTS	CHOLERA	CHOLERAIC DIARRHŒA	DIARRHŒA
98	3 Spectacle-makers	5†	6.	—
	3 Cleaners	—	—	—
	1 Tailor	—	—	—
	21 Ropemakers	4† 5. 7.	6. 7. 8† 8. 8. 16.	4. 4. 5. 5. 8. 10.
	9 Spinners	4† 6†	—	10.
	7 Weavers	5† 6. 6.	12.	—
	44			
99	2 Glovers	5† 6.	—	—
	1 Tailor	—	—	—
	3 Spinners	8†	—	23/11. 4.
	11 Weavers	29/11. 4† 7. 7.	—	5. 5. 6.
Hospital	17			
	2 Attendants	—	—	—
	1 Varicose Ulcer	—	—	—
	2 Spectacle-makers (Glossit & Absc. man.)	—	—	—
	2 Joiners (Erysip. of face)	1†	—	—
	(carbuncle of back)	2†	—	—
	2 Shoemakers (Gastric disorder)	1†	—	—
	(Oligoemia)	—	—	—
	3 Straw-workers (Pulm. Emphys.)	4†	—	—
	(Marasmus)	—	5.	—
	(Blepharitis)	—	—	—
	2 Weavers (Bright's Disease, Tonsillitis)	1†	—	—
	14			
Lock-up	1 Weaver	1.	—	—

Lastly I considered it also useful to make an alphabetical list of all persons attacked, in order to facilitate finding any individual case in the tables, which have been arranged according to occupation, dormitory, stage of disease, and the latter always in the alphabetical order of the names, and are kept by me in this state. It seems to me not improbable, that this great epidemic and its course in so isolated a group of persons may give rise at some later period to still further researches and considerations than I have hitherto instituted, and am about to discuss in the next few pages. If similar investigations should be hereafter carried out by others, it will be a boon to have some older lucidly arranged material to compare notes with.

I have not added the Christian name to the surname, as is usual, but the prisoner's number in the register, because the same Christian names are not unfrequently met with in company with the same surnames, and the identity of individual cases might thus be rendered doubtful, which is impossible when the number in the register is employed. I do not consider it necessary to publish this comprehensive table, but it is deposited with the documents and papers which I keep for future requirements.

COMPARISON BETWEEN DIFFERENT DEPARTMENTS OF WORK AND DIFFERENT LOCALITIES.

I will now compare first of all the different departments of work with each other.

Departments comprising less than 10 individuals cannot be chosen for purposes of comparison, because all kinds of accidental circumstances might seriously affect the figures or proportions: if however only those are compared which comprise more than 10 individuals, the 12 departments thus obtained give the following results.

OCCUPATION	Cholera	Choleraic Diarrhoea	Diarrhoea	Deaths
95 Spectacle-makers	20	9	27	9
12 Brushmakers	4	1	5	4
20 Farm-labourers	3	1	2	2
20 Blacksmiths and Locksmiths	5	2	3	2
63 Tailors	10	6	18	5
21 Joiners	11	—	3	11
42 Shoemakers	10	3	18	7
22 Rope-makers	3	6	6	2
36 Spinners and Knitters	9	1	6	9
88 Straw-workers	24	9	17	13
26 Washers	5	2	7	4
36 Weavers and Winders	15	3	6	8
481 Prisoners	119	43	118	76
	24.7 ⁰ / ₁₀	8.9 ⁰ / ₁₀	24.5 ⁰ / ₁₀	15.8 ⁰ / ₁₀

The mean number of attacks among these 481 prisoners is not essentially different from that found above at page 18 to obtain among all the inmates of the prison, but important differences are observed among the individual numerically equal divisions.

The 20 farm-labourers, the 20 blacksmiths and locksmiths, the 21 joiners, 22 rope-makers and 26 washers were very unequally attacked by the disease. The joiners came off the worst, 11 out of 21 being infected and all 11 dying of cholera, they were therefore more than 5 times decimated.

The farm-labourers were least visited, then the rope-makers and tailors. As regards the two former, probably most observers will consider the immunity as the result of their daily prolonged sojourn in the open air, i. e. the prolonged absence from infected spots, and I also agree with this view in the case before us, with this proviso however, that the sojourn in the open air very frequently but not always and of necessity implies a sojourn in a non-infected or non-infecting place.

There cannot be two occupations more different than husbandry and rope-making and yet as regards acute attacks, a similarly favourable condition prevailed among farm-labourers and ropemakers. The farm-labourers were principally occupied in October with cleaning and ploughing up the soil, throughout November with road-making, cleaning the roads and carting sand and gravel. The greater number of cases of choleraic and simple diarrhoea, which prevailed among the rope-makers, might be very well explained by the circumstance, that the rope-makers were obliged to remain within the prison walls, whilst the farm-labourers could remove to a distance from them, and further that the rope-makers worked in the hospital store-house in bad weather, the ground-floor of which was certainly a centre of infection. Besides which the rope-makers slept almost exclusively in No. 98, that part of the building, in which the epidemic began and was in general more violent.

In like manner nothing can be conceived more different than the trade of the smiths and locksmiths and that of the brushmakers. But both suffered above the average from cholera, and the brushmakers still more than the smiths and locksmiths. The two divisions slept together on the 2nd floor in room No. 64, and their workshops were directly adjacent to each other in the eastern part of the establishment on the ground-floor in Nos. 11 and 12. The smiths' workshop was of course somewhat more and better ventilated, than the workshop of the brushmakers, and it may very well be supposed, that on this very account the locksmiths suffered somewhat less than the brushmakers.

At the time of an epidemic of cholera, and especially at the time of such an immense outbreak, as that in Laufen, the greatest fear would be entertained for the department of washers according to the views commonly received. When we consider, in what a high degree the joiners suffered, who had nothing to do with those attacked, at most made coffins for the dead, it must appear remarkable, how comparatively little the washers suffered, in spite of their having to wash all the linen of those affected. The 26 linen-washers did not suffer proportionally so much, as the 20 rusty smiths and locksmiths. Whether the disinfection of the patients' linen, which was only put in force after the actual outbreak of the epidemic, can explain this, I must leave undecided.

The different degrees of immunity which were observed in the department of the spinners and knitters and that of the weavers and winders, each comprising 36 prisoners is remarkable. The weavers had 6 more cases of cholera and 2 more of choleraic diarrhoea than the spinners, but the same number of cases of diarrhoea and 1 death less than the latter. There is consequently a difference, whether we examine the number of attacks, or the number of deaths from cholera. — A satisfactory reason for this difference cannot be deduced either from the nature of the occupation, or from the individual circumstances of the individual prisoners. There were even somewhat younger persons on an average among the weavers, than among the spinners, the mean age of the 36 weavers being 33, that of the 36 spinners above 34. They had this one feature in common, viz, that their workrooms, were in the western part of the house, although their dormitories were mostly in the opposite eastern part. The workroom of the spinners is indeed very favourably situated. The steward's rooms and the guard-room of the soldiers are on the ground-floor in this part of the house, above them on the first floor the offices of the officials, then on the second floor the spinning-room, and above this on the third floor the dormitories of the shoemakers, which stand empty and are ventilated the whole day. This part of the house has also no cess-pool, which influence I shall discuss further on in a special section.

But even these circumstances are inadequate to explain the peculiar fact of the case, the real cause seems to lie in quite a different direction, as a glance at the above table illustrating the chronological distribution of the attacks with reference to occupation and dormitory clearly shows. If we compare there the groups of spinners and weavers, who both occupied adjacent dormitories in the western part of the house, which apart from the above-mentioned advantage of the spinning-room over the weaving-room—could only be favourable to both, we find that they had another circumstance in common with each other, viz, that they slept in many different dormitories; the 36 spinners occupied 9, the 36 weavers 7 different rooms. The rooms 56, 67, 97, 98 and 99 were tenanted by spinners as well as weavers. The epidemic ran a pretty uniform course among these departments as it did in the whole establishment, although the spinners were altogether about a day in advance of the weavers.

The greatest difference however was remarked strange to say in that very section of the spinners and weavers, which was quartered in one and the same dormitory No. 97. Thirteen spinners slept in this room, which was situated over the highly infected room No. 70, among whom there occurred only 1 case of choleraic diarrhoea and 1 of simple diarrhoea, and no case of cholera, and at the same time 10 weavers, among whom there occurred 6 cases of cholera all with fatal result and 1 of choleraic diarrhoea.

The remainder of the spinners (23) dispersed throughout the other dormitories presented 9 cases

of cholera all terminating fatally, and 5 of diarrhoea, and the remainder of the weavers in the other dormitories, amounting to 26 in number, presented only 8 cases of cholera with 1 fatal result, 2 of choleraic diarrhoea, and 5 of simple diarrhoea. Setting aside therefore the spinners and weavers in dormitory No. 97, the weavers came off decidedly better than the spinners, the exact reverse of what obtained in dormitory No. 97.

The temptation now was great to look for an explanation of these differences in room 97. I have not succeeded in finding out anything. I have compared the two groups as regards age, state of health, previous illnesses, duration of imprisonment, in short from every point of view contained in the tables, but without any positive result. As it would be however of such great importance and of such incalculable advantage, to get leading points of view for such occurrences, commonly called enigmas, but which may be only the expression of regular influences not yet discovered, I communicate in full the numerical tables relative to the 13 spinners and the 10 weavers in dormitory No. 97 (see pages 41. 42.) Perhaps another may be more fortunate than I, or may have his attention directed to things, which are wanting in the tables, and must in future, be drawn into the sphere of examination.

Can there perhaps be islands of immunity even in infected dormitories, as there are in infected places? Have the spinners in No. 97 accidentally had something in their beds, a different straw, or were they stuffed at another time? Or what else has protected them from cholera?—I regret, that this remarkable circumstance in room No. 97 did not present itself to my notice, whilst I was in Laufen, and that I neglected to examine the bedsteads of the individual prisoners. I know now only, that in future we must go still further into particulars than hitherto, if we would arrive at more certain conclusions by a process of exclusion. But this very case in a prison shows, how easy it must be, to prevent cholera, if we only knew the reason why 10 weavers and 13 spinners could lie together in the same room, and the weavers almost all died of cholera, whilst the spinners had not a single case. I think, what protected the spinners, must be so cheap and easily procured, that every body could be supplied with it at the time of cholera.

We shall next compare together two of the larger divisions, the 42 shoemakers and the 88 straw-workers, which are similar in so far, that the shoemakers worked exclusively in the eastern part of the establishment in Nos. 45 and 46 just under the joiners' dormitory No. 70, and slept exclusively in the western part in Nos. 80, 82 and 83, whilst the straw-workers likewise worked in the eastern part of the building (southern half) in room No. 47 on the first and No. 72 on the second floor, and the greater part of them (45) slept also in No. 32 on the first floor in the western part; only 24 being lodged in dormitory No. 70, in which the joiners also slept. It might be expected therefore, that the straw-workers would have suffered more than the shoemakers.

Taking the total number of cases of cholera, choleraic diarrhoea and simple diarrhoea into consideration, the shoemakers have suffered more (73 per cent) than the straw-workers (59 per cent). Taking only the cases of cholera and choleraic diarrhoea into consideration, the shoemakers have had fewer cases (30 per cent), the straw-workers more (37 per cent), but taking the deaths from cholera into consideration, both divisions have had the same (16 per cent). It cannot therefore at all events be said, that the straw-workers, a part of whom slept in 70, suffered more than the shoemakers.

It is to be remarked further, that among the 24 straw-workers, who were assigned to room No. 70, there were 5, who were not removed there from solitary confinement until December 4th, and 3 who did not come to the establishment until after December 1st, so that in reality only 16 can be reckoned.

Lastly there were 2 other divisions, 95 spectacle-makers and 63 tailors, who had this circumstance in common, that their workrooms were in the western half of the building, as also the greater part of their dormitories, which latter were only partially in the eastern half. The tailors' shop is No. 38 on the first floor, that of the spectacle-makers No. 84 on the third floor, the tailors' dormitories No.'s 39 and 41 on the first floor, the spectacle-makers occupying the corresponding rooms above these on the third floor. The locksmiths and brushmakers slept between these in No. 64 on the second floor, and the farm-labourers

(continued, p. 43)

SPINNERS AND KNITTERS IN DORMITORY No. 97.

Current No. No. in Register	NAME	AGE	TRADE		WORKROOM DORMITORY	Duration of imprison- ment	State of health on admission	Attack in the establish- ment		NATURE OF ATTACK	REMARK
			outside the establishment	in the establish- ment				Day	Month		
12378	Duschl, Joh., single	33	Man-servant	Spinner	5797	3 mos	Fair (chron. bronch. catarrh)	5	Dec.	Chol. Diarrhœa	Discharged cured Dec. 14th
22581	Holzmüller, Seb., single	34	Man-servant	Spinner	5797	since Nov. 15 1873	Fair	24	Nov.	Diarrhœa, treated out of hospital	Came from the goal at Munich (Anger No. 1) where he had been 8 mos in prison and fell ill before his removal here
32373	Blau, Carl, single	42	Labourer	Spinner	5797	3 mos	Fair		Sept. Oct.	Scurvy Gastric disorder	
42347	Brumbauer, Lor., single	31	Butcher	Spinner	5797	3½ mos	Robust				Discharged free from the establishment Dec. 10th
52461	Fischer, Mich., married	40	Cottager	Spinner	5797	2 mos	Robust	1 14	Dec. "	Bronch. Catarrh. do.	
62383	Freidl, Josef, single	28	Fisherman	Spinner	5797	3 mos	Robust				Discharged Dec. 27th 1873
72350	Hoff, Johann, married	25	Labourer	Spinner	5797	3½ mos	Robust		Sept " Oct.	Scurvy Angina tons. Ecthyma dors.	Treated as out patient do. do. Discharged Dec. 11th
82556	Mader, Josef, single	30	Man-servant	Spinner	5797	3 weeks	Robust				
92431	Müller, Lorenz, married	31	Shepherd	Spinner	5797	2½ mos	Robust				
102411	Pellkofer, Josef, married	58	Peasant	Spinner	5797	3 mos	Robust				Was employed in potato- peeling with 11 other prisoners
112376	Rath, Georg, single	21	Bricklayer	Spinner	5797	3 mos	Robust				Entered hospital as attendant on Dec. 15th
122360	Resch, Josef, married	39	Bricklayer	Spinner	5797	3½ mos	Fair				Discharged Dec. 14

SPINNERS AND KNITTERS IN DORMITORY No. 97.

Current No.	No. in Register	NAME	AGE	TRADE		WORKROOM	DORMITORY	Duration of imprisonment	State of health on admission	Attack in the establishment		NATURE OF ATTACK	REMARK
				outside the establishment	in the establishment					Day	Month		
12	2371	Straubinger, Jos., single	32	Dealer in wood	Spinner	57	97	3½ mos	Robust		Aug.	Prim. Syphilis	Discharged from the establishment Dec. 19th

WEAVERS AND WINDERS IN DORMITORY No. 97.

1	2441	Eckl, Mathias, married	41	Labourer	Winder	58	97	2 mos	Robust		5 Oct. Dec.	Scurvy Asiatic Cholera	Treated as out-patient Died in typhoid stage Dec. 9th
2	1517	Hötschl, Martin, single	33	Man-servant	Weaver	58	97	1¼ years	Fair (Dyspepsia)		5 June Sept. Dec.	Diarrhœa and Gastric disorder Scurvy and Oligœmia Asiatic Cholera	Treated in hospital Treated as out-patient Died of cholera Dec. 6th
3	2138	Hofdeck, Alexis, single	29	Weaver	Weaver	58	97	6½ mos	Robust		5 Sept. Dec.	Scurvy Asiatic Cholera	Treated as out-patient Died in typhoid stage Dec. 8th
4	2092	Hofmarksrichter, Josef, single	26	Servant	Weaver	58	97	5 mos	Robust		5 Oct. Dec. 6	Erysipel. of face Diarrhœa Asiatic Cholera	Did not consult doctor Died suddenly of cholera Dec. 6th
5	2517	Pfefferl, Georg, single	54	Labourer	Weaver	58	97	5 weeks	Fair (Paresis cruris)		5 Dec.	Asiatic Cholera	Died after 10 hours' illness
6	2262	Waldinger, Mich., single	24	Bricklayer	Weaver	58	97	4½ mos	Robust		6 Dec.	Asiatic Cholera	Died of cholera on Dec. 10th
7	2269	Reischl, Josef, single	25	Weaver	Weaver	58	97	4½ mos	Fair (Pulmonary tubercle)		1 Nov. Dec. 5	Gastricism. Diarrhœa Chol. Diarrhœa (relapse)	Treated in hospital Cured on Dec. 4th
8	2231	Binder, Joh., widower	45	Bricklayer	Weaver	58	97	5¼ mos	Fair		Oct.	Scurvy	Treated as out-patient
9	2476	Hartmann, Josef, married	35	Weaver	Weaver	58	97	2 mos	Robust				Was formerly treated as out-patient for irrelevant symptoms appointed hospital attendant Dec. 4th
10	2226	Huber, Ignatz, single	22	Servant	Weaver	58	97	5¼ mos	Fair (Pulmonary tubercle)		Sept.	Scurvy	Treated as out-patient

in an adjoining room No. 67, only separated by an overseer's room. Next to the farm-labourers and rope-makers the spectacle-makers and tailors undoubtedly came off the best. If we take all three forms of disease together, the spectacle-makers showed 58, the tailors 54 per cent, which was not below the mean of the whole establishment, but looking only at the acute forms of disease, and especially at the deaths, there is an evident balance in favour of the two divisions, as the following comparison clearly shows:

	Spectacle-makers	Tailors	All prisoners
Cholera	21.0	15.9	24.5
Choleraic Diarrhœa . .	8.4	9.5	8.2
Diarrhœa	28.4	28.9	23.9
Deaths from Cholera .	9.4	7.9	15.9

The attacks which befell those spectacle-makers and tailors, who were quartered here and there in other dormitories than those assigned to the majority, have not been deducted here. Among the 5 spectacle-makers in dormitories Nos 80 and 98 there occurred 1 case of cholera, 1 of choleraic and 2 of simple diarrhœa, and 1 death, and among the 13 tailors dispersed about in other dormitories 3 cases of cholera, 1 of choleraic diarrhœa, 4 of diarrhœa and 2 deaths.

It appears very evident from the number of cases of cholera and choleraic diarrhœa and deaths which occurred in the dormitories Nos 39 and 41 on the first, and in those of the spectacle-makers Nos 91 and 94 on the third floor, that the intensity of the disease increased as we approached the east front of the building. The rooms 41 and 94 belonging to the northern wing of the building, have each one window opening to the east. Room 41 on the first floor has indeed only this one window, whilst the corresponding rooms 67 and 91 above it have each besides this window to the east two other windows to the north which are wanting in room No. 41, the cell-prison being built up against the northern wall of the room on this side. Room 41 is therefore considered close, and not so well ventilated as those situated above it, is on this account also never occupied by so many prisoners as the smaller room No. 39, which has two windows to the north. The second floor of the main building looks directly over the roof of the adjacent cell-prison and has therefore retained the two windows to the north.

Thirty tailors now slept in room 39, of whom only 3 were attacked with cholera, 2 with choleraic and 9 with simple diarrhœa, and 2 died. Twenty tailors slept in room 41, 4 of whom were attacked with cholera, 3 with choleraic and 5 with simple diarrhœa, whilst 1 died. Room 41 therefore presented 20 per cent of acute attacks (cholera), room 39 only 10 per cent.

The same thing was observed on the third floor in the dormitories of the spectacle-makers. Thirty two spectacle-makers slept in No. 91, and they presented 5 cases of cholera = 16 per cent, 56 slept in the room No. 94 lying to the east, and had 14 cases of cholera = 25 per cent. The cases of cholera began on December 3rd in room 94, on the 4th in 91.

The division of the joiners was the only one that remained day and night without interruption in the eastern wing, they alone were constantly in the centre of the eastern wing, and never left it. They worked in No. 71 and partly also in an adjoining room No. 72 opening into the passage, and slept close by in No. 70. Only 19 of the 21 joiners slept at the time in No. 70, 2 of them being in the hospital when the cholera broke out, the one with erysipelas of the face, the other with a carbuncle, both of them also took the cholera and died, but their infection must be placed to the account of the hospital. Among the 19 joiners in dormitory No. 70 there were 9 cases of cholera (47 per cent), which all terminated fatally, and only 3 of diarrhœa. No other department suffered so enormously.

The room 70 proved also injurious to its other occupants, who spent the day at a greater distance from it than the joiners. The number of its inmates rose gradually during the course of the epidemic to 52 persons. Deducting the 19 joiners from these, there still remain 33 persons, who were exposed to its nocturnal influence. From these 8 prisoners (straw-workers) are to be deducted, who were not transferred to it from solitary confinement until December 4th (see table at page 23), likewise one who arrived on Dec. 3rd. After deducting these there were besides the joiners:

1 Bookbinder,
2 Glove-makers,
1 Barber,
2 Tailors,
3 Spinners and
16 Straw-workers.

Total 25 prisoners.

These furnished 7 cases of cholera = 28 per cent,
2 cases of choleraic diarrhœa = 8 „
1 case of diarrhœa = 4 „
5 cases of death = 20 „

One of the glove-makers took the cholera and died. The barber took the cholera and died. One tailor took the cholera. Two of the 3 spinners took the cholera and both died. It is evident that slight cases did not occur at all in this dormitory properly speaking. The cases of diarrhœa prevailed for the most part only as sequelæ among those, who were transferred to this dormitory from solitary confinement on December 4th.

Of these 8 prisoners who came from the cell-prison, 4 had diarrhœa and 1 even cholera, the only case which ended fatally among those removed from the cell-prison to the common prison.

The number of these prisoners removed from solitary confinement to the common prison amounted to 34. They had afterwards altogether 11 more cases of diarrhœa, 1 of choleraic diarrhœa, 2 of cholera and 1 case of death. Eight were quartered in No. 70. All the cases of death and 4 cases of diarrhœa (36 per cent of all cases of diarrhœa) affected these 8 individuals (23 per cent of 34).

Whilst I was in Laufen, my attention was drawn to the fact that another section of prisoners consisting for the most part of straw-workers had suffered very much, indeed most after the joiners, namely those, who were employed in peeling potatoes for the kitchen in November and even later. This work was performed in workroom No. 47, and 12 mostly elderly and decrepid individuals were selected for it.

NAME	AGE	FORMER OCCUPATION	Dormitory No.	ATTACK		REMARKS
				Day	Nature	
Sagerer	68	Straw-workers	97	Dec. 2	Cholera	Died
Ettl	31	"	48	Nov. 30	Cholera	Died
Strassburger	45	"	48	—	—	
Sehnitzer	59	"	32	—	—	
Huber	45	"	32	Dec. 8	Chol. Diarrhœa	
Maier	66	"	32	Dec. 7	Cholera	
Hofstetter	49	"	32	—	—	
Retzer	62	"	32	Dec. 5	Cholera	Died
Mosch	67	"	32	Dec. 12	Chol. Diarrhœa	Died (Marasmus)
Knöpfle	55	"	32	Dec. 5	Cholera	Died
Pellkofer	58	Spinner	97	—	—	
Sporrer	53	Knitter	97	Dec. 3	Cholera	Died

Only 4 among these 12 persons were a little under, the remaining 8 all above 50 years old, and this might lead us to suppose that the high degree of disease and mortality proceeded from age. I thought however that I ought to prosecute my researches still further, as just as high a rate of disease and mortality had appeared in other departments of labour consisting mainly of young robust individuals, whose mean age did not exceed 25, as among these old decrepid potato-peelers. It seemed to me all the more necessary, to scrutinize the potato-peelers somewhat more closely, when I discovered in my inspection of the establishment from top to bottom, that liquid matters from the cess-pool, which is situated in the hospital yard to the north of the main building penetrated in no inconsiderable quantity into that part of the cellar, in which the potatoes were stored. — The potatoes were it is true carefully kept clear of that spot, and tubs were placed under for the reception of the liquids which dropped through, — but it was always possible, that some of the infecting matter generally supposed to exist in excrements, might have reached the potatoes, and that the potato-peelers, who first came in contact with it, received proportionally more of it than the others. — But the investigation has proved most positively, that no infecting matter can be assumed to have adhered to the potatoes. I first compared the rate of disease and of mortality among the potato-peelers with that among the other inmates of the prison who were above 50. There were 41 prisoners 50 years old and upwards. Among these occurred:

19 cases of cholera	= 46 per cent.
4 „ „ choleraic diarrhœa	= 10 „
6 „ „ diarrhœa	= 15 „
20 deaths	= 48 „

Among the 12 potato-peelers occurred:

6 cases of cholera	= 50 per cent.
2 „ „ choleraic diarrhœa	= 15 „
— „ „ diarrhœa	= — „
6 deaths	= 50 „

These differences are so slight that taking into consideration the smallness of the number of potato-peelers no positive conclusion can be drawn from them.

Nor does it make any difference, if we exclude the 8 potato-peelers above 50 years old from the 41 older prisoners. — There appear then among 33 of the oldest prisoners:

14 cases of cholera	= 42 per cent.
3 „ „ choleraic diarrhœa	= 9 „
6 „ „ diarrhœa	= 18 „
14 deaths	= 42 „

What however most militates against the view of the infection arising from the common work of potato-peeling, is the chronological distribution of the attacks in this group. One occurred as early as November 30th, one on the 2nd, one on the 3rd, two on the 5th, one on the 7th, one on the 8th, and one on the 12th of December, consequently more scattered in point of time than was the case with any other division of labour. (Compare the two tables on the chronological distribution of attacks in relation to occupation and dormitories.) The attacks were more crowded in point of time everywhere else. Among the joiners, e. g. in dormitory 70 one took the cholera on December 1st, one on the 3rd, four on the 4th and three on the 5th, and this was the last of them. Considering the high individual predisposition which must be assumed to have been present among the potato-peelers in virtue of their age, the attacks should have occurred very simultaneously, if a common and simultaneous infection had taken place.

INFLUENCE OF AGE.

Prisoners from 16 to 73 years old were in the establishment. The influence of age on the frequency of cholera in general has been already often investigated, and the investigation has always shown, that the individual tendency to be attacked by genuine cholera is very different at different ages, that as a rule the age of childhood from about the 8th year and the period of youth up to about the 22nd year is least attacked, that then the tendency increases somewhat until 40, that it however rapidly increases from this time, which likewise holds good as regards the mortality, only in a still higher degree. It would have been superfluous therefore to repeat this investigation in the prison at Laufen. But other circumstances rendered it expedient to do so: first not only were the cases of cholera and deaths from cholera exactly known in this case, but also the number of cases of choleraic and simple diarrhoea, which we are justified in regarding as induced by the same specific cause, but which can seldom be studied with such exactness as in the case before us, and then it was a point of great interest to consider and compare the already well-known influence of age with other influences arising from occupation and locality.

The table at page 47 gives the age in the first column, in the second the number of prisoners of this age, and the remaining columns give the numbers of those attacked with cholera and choleraic diseases in their several forms, and how many remained entirely free from disease. Among those aged 18 some are also included, who had not yet quite reached this age. This table shows a slight difference to the former ones, it mentions 129 cases of cholera and 42 of choleraic diarrhoea, whilst 128 cases of cholera and 43 of choleraic diarrhoea are enumerated elsewhere. I have probably inscribed a case of choleraic diarrhoea among those of cholera in copying from the individual tables, but it did not seem to me worth while going any further into this mistake, as it cannot exercise any material influence upon the result. (See table at page 47).

I have first of all divided the 522 prisoners into 4 groups, from 16 to 22, from 23 to 29, from 30 to 39 and from 40 upwards. These 4 groups furnish the following numbers:

AGE	16 to 22	23 to 29	30 to 39	40 to 73
Number of persons .	113	155	140	114
Cholera	13	34	39	43
Choleraic diarrhoea .	10	12	9	11
Diarrhoea	36	33	34	22
Deaths	6	21	20	36

If we calculate the percentage of attacks and deaths for each group from these figures, we have the following result:

Cholera	11.5	21.8	27.8	37.7
Choleraic diarrhoea .	8.8	7.7	6.5	9.6
Diarrhoea	31.8	21.1	24.2	19.3
Deaths	5.3	13.5	14.2	31.3
	52.1	50.6	58.5	66.6

Dr. Berr has ascertained, that the mean age of

all the prisoners amounted to	29 years
those attacked	32 „
those who died	35 „

LIST OF THE ATTACKED AND EXEMPT IN RELATION TO AGE.

AGE	NUMBER OF THOSE IN THE ESTABLISHMENT					AGE	NUMBER OF THOSE IN THE ESTABLISHMENT						
	TOTAL	ATTACKED WITH			EXEMPT		TOTAL	ATTACKED WITH			EXEMPT		
		Cholera	Choleraic Diarrhoea	Diarrhoea				Cholera	Choleraic Diarrhoea	Diarrhoea			
18	15	1	†1	1	5	8	43	5	2	†2	1	—	2
19	22	1	†1	2	8	11	44	5	2	†1	—	2	1
20	25	3		2	8	12	45	9	2	†1	—	3	4
21	24	5	†3	2	8	9	46	3	1	†1	—	—	2
22	27	3	†1	3	7	14	47	5	3	†2	—	1	1
23	19	6	†3	2	2	9	48	3	1	†1	1	1	—
24	24	6	†5	—	7	11	49	7	1	†1	1	3	2
25	25	3	†1	6	3	13	50	4	3	†3	—	—	1
26	23	5	†3	2	6	10	51	5	2	†1	—	—	3
27	20	4	†2	2	2	12	52	3	1	†1	—	1	1
28	26	5	†3	—	7	14	53	7	2	†2	1	2	2
29	19	5	†4	—	6	8	54	3	2	†2	—	—	1
30	18	4	†3	3	5	6	55	1	1	†1	—	—	—
31	21	7	†5	1	6	7	56	3	2	†2	—	1	—
32	10	—		—	2	8	58	1	—		—	—	1
33	12	5	†2	2	1	4	59	5	2	2†	—	1	2
34	18	3	†1	1	7	7	60	1	—		—	1	—
35	13	3	†1	2	2	6	61	1	1	†1	—	—	—
36	18	9	†4	—	2	7	64	1	1		—	—	—
37	16	5	†4	—	6	5	65	1	1	1†	—	—	—
38	7	1		—	2	4	66	2	1		—	—	1
39	6	2		—	1	3	67	1	—		†1	1	—
40	16	4	†2	†1 3	2	7	68	1	1	1†	—	—	—
41	9	3	†3	1	2	3	73	1	—		1	—	—
42	11	4	†3	1	2	4							
Total	444	97	†55	†1 36	109	202		78	32	†26	†1 6	16	24
								444	97	†55	†1 36	109	202
							Total	522	129	†81	†2 42	125	226

In the first place we perceive, that those aged 40 and upwards have suffered most also in the prison at Laufen as everywhere else, both as regards cases of cholera and especially deaths, and the percentage of both is seen to increase from youth to age, although not in exact proportion to the increase of years.

The cases of choleraic diarrhoea differ much less comparatively than the cases of cholera, the cases of diarrhoea on the contrary are almost the exact reverse of those of cholera; they are most frequent in the youngest and most seldom in the oldest group. The first group has been somewhat protected against severe form of disease not only by its youth but also by another circumstance, viz the greater part of the 34 cell-prisoners belonged to them, who were not removed to the common prison till December 4th, and consequently were not exposed to the full infecting power of the main building. But even when these are excluded, the first group has still the advantage as regards cases of cholera and deaths.

Among the prisoners removed from solitary confinement to the common prison there were 27 under 23 years old. They presented

1 case of cholera,
 1 " " choleraic diarrhoea,
 10 " " diarrhoea,
 1 death.

Three were between 23 and 29. They presented

1 case of cholera.

Two were between 30 and 39. They remained exempt.

Two were above 40. They presented

1 case of diarrhoea.

Deducting these 27 younger cell-prisoners from the remaining 113 prisoners belonging to the same group, there remain 86, who had been always in the common prison. They presented

12 cases of cholera	= 13.9 per cent.	} 54.5 per cent.
9 " " choleraic diarrhoea = 10.4 " "		
29 " " diarrhoea	= 30.2 " "	
5 deaths	= 5.8 " "	

If we compare the 27 persons who were previously in solitary confinement with the above, we find among them

1 case of cholera	= 3.7 per cent.	} 44.4 per cent.
1 " " choleraic diarrhoea. = 3.7 " "		
10 " " diarrhoea	= 37.0 " "	
1 death	= 3.7 " "	

The difference therefore between solitary confinement and common imprisonment is not so evident in the general rate of sickness (44.4 and 54.5 per cent) as in the number of acute attacks and deaths which correspond thereto (cholera and choleraic diarrhoea in the one case being 7.4 per cent, in the other 24.3 per cent).

The whole population of the prison it has been shown above at page 18 was affected as follows:

Total rate of sickness 56.7 per cent.		
Cholera	24.5 " "	} 32.7 per cent. } 56.6 per cent.
Choleraic diarrhoea . .	8.2 " "	
Diarrhoea	23.9 " "	
Deaths	15.9 " "	

We might be tempted to attribute the more favourable condition of the cell-prisoners less to their locality than to a slighter individual predisposition in consequence of more regular circumstances, a larger space etc., the amount of sickness and mortality from all diseases being usually less in cell-prisons than in ordinary prisons. The favourable influence arising from the previous prolonged sojourn in the cell-prison may be supposed to have continued even on removal to the common prison. There is not much to object to in such a supposition, there is indeed much probability in it, but on the other hand even making this allowance the influence of the new locality manifested itself very distinctly notwithstanding in the removal of these 27 young people from their cells to the main building. Eight of them were placed for instance in dormitory No. 70, and 8, consequently the same number, in the room No. 94, and it might be supposed, that these 2 groups of 8 each would be equally affected. There is however a great difference. The 8 in room No. 70 had 1 case of cholera, 4 of diarrhoea and 1 death after their entrance, the 8 on the contrary in No. 94 only 1 case of diarrhoea. I shall prove further on, that not even youth found pity in the eyes of the destroying angel in room No. 70.

It is interesting, to pursue the influence of age still more in detail. It may be considered as proved that the individual groups do not differ from each other in the total number of attacks of

cholera, choleraic and simple diarrhoea, but — on an average at least — in the number of attacks of more acute diseases, of cholera and choleraic diarrhoea, which as well as the deaths increase with age.

I have now divided each of the larger departments of labour into 2 halves, a younger and an older, and reckoned the number of cases of cholera, choleraic diarrhoea and deaths affecting them.

The department of the straw-workers comprises 88 prisoners, each half 44. The younger half includes people from 17 to 31, and their mean age is 23.

The older half includes people from 31 to 73, and their mean age is reckoned at 45 years. A very great difference exists therefore between the two mean ages, proving that many of those in the second half were at an advanced age.

The younger half of the straw-workers had

7 cases of cholera	= 15.9 per cent,
5 „ „ choleraic diarrhoea	= 11.4 „
3 deaths	= 6.8 „

The older half had

18 cases of cholera	= 40.9 per cent,
4 „ „ choleraic diarrhoea	= 9.0 „
11 deaths	= 25.0 „

This result therefore harmonizes fully with the general rule. Moreover there is the numerous department of the spectacle-makers 95 in number, 47 belonging to the first division comprising persons from 18 to 27 with a mean age of 22, and 48 to the second half comprising persons from 28 to 59 with a mean age of 37. The mean age of the two halves is therefore not nearly so different as among the straw-workers, and it is consequently to be expected, that the two halves of the spectacle-makers will exhibit a correspondingly smaller difference as regards cases of cholera and deaths.

The younger half of the spectacle-makers had

8 cases of cholera	= 17.0 per cent,
6 „ „ choleraic diarrhoea	= 12.6 „
1 death	= 2.1 „

The older half had

12 cases of cholera	= 25.0 per cent,
2 „ „ choleraic diarrhoea	= 4.1 „
8 deaths	= 16.6 „

We see that the assumption holds good, at least as regards the cases of cholera and deaths.

That besides age the locality also exercises a powerful influence upon the more acute forms and deaths, is unmistakably manifest especially in the case of the spectacle-makers. The 95 spectacle-makers all worked, as appears in the table communicated at page 30, in one room (No. 84), and slept principally, with the exception of those dispersed in some other rooms, in the rooms Nos 91 and 94.

Thirty-two slept in No. 91, and they presented

5 cases of cholera	= 15.6 per cent,
6 „ „ choleraic diarrhoea	= 18.7 „
1 death	= 3.1 „

Fifty-six slept in room No. 94, and they presented

14 cases of cholera	= 25.0 per cent,
2 „ „ choleraic diarrhoea	= 2.6 „
7 deaths	= 12.5 „

It is evident, that room 94 was much more heavily visited than room No. 91, that the difference particularly in the number of deaths is just as great, as between the younger and older halves of the

straw-workers, among whom the mean age of the two halves was 23 and 45. The question therefore arises here, whether the difference of age between the spectacle-makers in rooms 91 and 94 was perhaps also similar. The investigation shows now that the average difference of age among the prisoners in the two rooms was but insignificant. The mean age of the 32 spectacle-makers in No. 91 was 27, that of the 56 in No. 94 only a little higher, 34.

The 14 prisoners who were affected with genuine cholera in room No. 94, were of the age of 23, 24, 25, 27, 28, 29, 31, 33, 36, 37, 42, 56 and 59, and among those who remained free from cholera in No. 91 there were 10 over 30, and one even 53. — Some other causes therefore must have occasioned this great difference. As all the spectacle-makers worked in one and the same room, as they had all exactly the same food etc., and the two parties had only different dormitories, I cannot help attributing some influence here also to the dormitory. Room 91 is a part of the western, room 94 of the eastern portion of the main-building.

Great exceptions to the influence of age occur here and there also in the other departments of labour. The 63 tailors e. g. who suffered remarkably little, exhibited in the younger half, comprising people from 16 to 27, a mean age of 23, and in the older, comprising people from 28 to 53 a mean age of 36 are therefore on an average of the same age as the spectacle-makers.

The younger half of the tailors had

6 cases of cholera	= 18.7 per cent,
5 „ „ choleraic diarrhœa	= 15.6 „
2 deaths	= 6.2 „

The older half

4 cases of cholera	= 12.9 per cent,
1 „ „ choleraic diarrhœa	= 3.2 „
3 deaths	= 9.7 „

The relation is reversed as regards the tailors, the younger half had materially more cases of cholera and choleraic diarrhœa than the older, only in the deaths does the influence of age re-assert itself although very feebly in favour of the rule.

The tailors all worked like the spectacle-makers in one room No. 38, and slept for the most part in two rooms, 30 in No. 39 and 20 in No. 41. The remaining 13 were quartered with the prisoners in other dormitories, being occupied with patchwork for the time being.

The 56 who slept in the two dormitories appropriated to the tailors, had together (see table of the chronological distribution of attacks in relation to occupation and dormitories at page 34)

7 cases of cholera	= 12.5 per cent,
3 deaths	= 5.3 „

The 13 tailors dispersed among the other prisoners in the other dormitories had

3 cases of cholera	= 23.0 per cent,
2 deaths	= 15.3 „

The mean of the whole prison population is (see above at page 18)

for cases of cholera	24.5 per cent,
„ deaths	15.9 „

Whilst therefore the tailors in the rooms specially appropriated to them remain far below the mean both as regards cases of cholera and deaths, that section of the tailors which slept dispersed among the whole prison population, presented the very same mean as all the prisoners.

In the above comparison between the younger and older halves of the tailors the influence of dormitories has not been considered. If we now eliminate the cases of cholera and deaths, which did not affect the dormitories Nos 39 and 51, we find,

1 case in dormitory No. 67 Käfer	2477	| oct. 35, died,
1 " " " " 70 Bauer	2578	| oct. 20, and
1 " " " " 83 Brandstetter	2587	| oct. 47, died.

Of these Bauer belonged to the younger half, the two others, Käfer and Brandstetter to the older. Deducting these 13 tailors in the above comparison of the two halves, the younger presents a still more unfavourable contrast to the older.

This circumstance invites us to further investigation. The first thing which occurs to us is the question, whether the younger and the older portion of the tailors were distributed in such a manner in the two dormitories Nos 39 and 41, that the younger half occupied the unfavourable locality, the older the favourable locality in this case. The room 39, which contained 30 inmates during the epidemic, belongs to the western part of the house, and is immediately adjacent to the tailors' workshop, and the room 41 with 20 inmates to the eastern part and has, as is evident on the plan, only a single window to the east.

The 30 tailors in dormitory 39 number together 909 years, have consequently a mean age of 30, and the 20 tailors in dormitory 41 number together 528 years, and have therefore a mean age of 26 years. It is a fact that the eastern part of the house appeared throughout to be the worst, and it is likewise a fact, that the younger part of the tailors was more numerously represented in the eastern dormitory No. 41, than the older in the western room No. 39, although the latter contained a greater number of inmates in proportion to its size. The facts therefore really coincide in this case with the assumption, that the influence of locality has counterbalanced in some measure the influence of age, nay, that the influence of locality has been more emphatic than the influence of age, that the common rule has been actually reversed by it in this case.

Whether now the coincidence of the facts with the assumption is accidental, or the result of a physical connexion, cannot be determined at present, but the case is important enough, to invite the earnest attention of investigators in any cases occurring in the future.

The division of the 42 shoemakers likewise resisted the influence of age up to a certain point. The younger half, comprising people from 17 to 30, had a mean age of 25, the older from 32 to 59 a mean of 39. The shoemakers were older than the tailors by a few years.

The younger half exhibited

5 cases of cholera	= 23.8 per cent,
1 " " choleraic diarrhoea	= 4.8 "
3 deaths	= 14.3 "

The older half

5 cases of cholera	= 23.8 per cent,
2 " " choleraic diarrhoea	= 9.5 "
4 deaths	= 19.0 "

Here the difference is slight, but is not so antagonistic to the rule as in the case of the tailors, the older half has although not more cases of cholera, at least somewhat more cases of choleraic diarrhoea and deaths than the younger.

Both halves were attacked with the more acute diseases in the same ratio as the general body of prisoners. All the shoemakers had the same workroom No. 46 and the small adjacent room No. 45 on the first floor, which is situated exactly under the so heavily visited dormitory of the joiners No. 70 on the second floor in the eastern part of the building, and all slept in the western part in the dormitories, Nos 80, 82 and 83. Two were in the hospital. The number of attacks and deaths was pretty uniform among them in the different dormitories. There was a difference only in the cases of diarrhoea. If the cases of diarrhoea are also included, the shoemakers had altogether an extremely high rate of sickness, those in

dormitory 80 = 55.9 per cent,

„ 82 = 88.2 „

„ 83 = 100.0 „

altogether 71.4 „

The mean age of the shoemakers distributed in the three dormitories is pretty equal, the 20 in room No. 80 number together 668 years, the 9 in room No. 82: 277, and the 11 in room 83: 363 years, corresponding to a mean age of 33, 31 and 33 years.

The influence of age between the attacked and non-attacked is very evident in room 80, where the majority were quartered. The 6 attacked with cholera and choleraic diarrhoea had a mean age of 37 years, as well as the 5 attacked with diarrhoea, on the contrary those who remained exempt had a mean of not quite 29 years.

Apart from the circumstance, that comparatively more younger people (some were but 17 and 18) were in room No. 80 than in the two other rooms, the comparatively slight number of cases of diarrhoea in contrast to rooms Nos 82 and 83 still remains in reality unexplained, like the remarkable immunity of the 13 spinners in room No. 97.

Altogether the influence of age appears very unimportant in the case of the shoemakers, and their rate of sickness is on the whole very high. I am certainly right in attributing this fact to the circumstance, that a common focus of infection in all probability to be sought for in their workroom, exercised a general and intensified influence upon them. Their workshop is situated in the centre of the east part of the main building, and if the shoemakers had slept there also, perhaps they would have fared still worse than the joiners, who remained day and night in this part of the house.

Of the joiners in the establishment

10 (from 19 to 25) had a mean age of 22,

11 (from 28 to 65) „ „ „ „ „ 39.

The younger half had

5 cases of cholera = 50 per cent,

— case of choleraic diarrhoea = — „

5 deaths = 50 „

The older half

6 cases of cholera = 54.5 per cent,

— case of choleraic diarrhoea = — „

6 deaths = 54.5 „

Two might be deducted from the older half, who were in the hospital on account of other maladies at the time of the outbreak of cholera, were attacked there and died of cholera. But the younger half would then present a still more unfavourable contrast, for then only 44.4 per cent of the older half would have been attacked with and died of cholera, whilst 50 per cent of the younger suffered.

The difference between old and young, a rather considerable one (22 and 39) is wholly unimportant in the case of the joiners. There must have been some good reason, why milder forms of disease hardly occurred in this division (the 21 joiners had 11 cases of cholera ending fatally and only 3 of diarrhoea) but only fatal attacks of cholera.

Nothing is to be found in the individual circumstances of the joiners calculated to explain even in the remotest degree the unexampled virulence of the disease among them. The joiners in prison are as a rule among the elite of their company. Not only a certain skill and ability, but also bodily vigour is requisite, where a prisoner has to be employed in joinery. The younger half of the joiners presents the lowest mean age (22) of all departments of labour in the prison at Laufen. Two of the 11 deaths which occurred among the joiners are, as already mentioned, to be put to the hospital account; they were

certainly elderly people, one 51, the other 65 years old, but the remaining 9 were mostly robust men and were 19, 21, 21, 23, 24, 31, 37, 48 and 50 years old. Here therefore the common rule does not at all hold good, that age makes a difference.

Neither can the cause be sought in the joiner's work, for it has never yet been observed in cholera epidemics either in large cities or in large prisons, that the joiners have had principally to suffer.

Nor can the cause exist in the other domestic circumstances of the joiners, for they were exactly the same as among the other prisoners, they had no other food, no other clothes, no other bed etc., than all the rest. The only thing, that could be mentioned as a difference, was, that the joiners could take a drop of brandy here and there, as they required spirits of wine for polishing purposes. But it is not to be supposed, that it was supplied to them in such quantities at Laufen, that they could all have become dram-drinkers, not even if they had been willing to drink the prepared solution of lac. Only their locality was peculiar to them, and they were distinguished from all the rest in this single fact, viz, that no other division worked and slept so exclusively in the same point of the house, in Nos. 70 and 71, the centre of the eastern part, which was characterised throughout as the most baneful.

I will only add further, that the rooms could not be injurious by reason of their arrangements, or dimensions. A joiner's workshop naturally required a much larger space than a tailor's workroom or a spinning-room. And the dormitory of the joiners with its 3 windows is indeed one of the finest, largest, and brightest rooms in the whole establishment. There remains therefore but one mode of explanation, to regard a certain situation in the house as the predisposing cause.

INFLUENCE OF IMPRISONMENT ON THE ATTACKS OF CHOLERA.

It is a very generally received opinion, that long-continued imprisonment materially predisposes to cholera. The circumstance that the cholera chose Laufen out of all the Bavarian prisons for such an unheard of explosion as had never yet occurred in this land, already militates against this view. The duration of punishment is comparatively short in Laufen. The establishment is no house of correction, but only a prison, and most of those within it, are condemned only to a few months imprisonment. In the house of correction at Au in Munich there were a great number of convicts condemned to 10 and 20 years, some even for life, and yet this house of correction remained quite free from cholera on this occasion; only two cases imported from Munich occurred in the house of correction at Lichtenau, where similar conditions prevail, and the house of correction for female convicts at Wasserburg had only very few cases.

Although for these general reasons no essential difference dependent on longer or shorter duration of imprisonment was to be expected at Laufen, I yet considered it my duty to employ the opportunity presented to me of minutely investigating this influence. I counted those who had been 2 months and less in confinement. Their number amounted to 163.

These 163 had

40 cases of cholera	= 24.5 per cent	} 53.3
13 „ „ choleraic diarrhoea	= 8.0 „	
34 „ „ diarrhoea	= 20.8 „	
31 deaths	= 19.0 „	
76 not attacked	= 46.6 „	

Deducting these 163 prisoners, and the attacks and deaths which occurred among them from the whole prison population of 522, there remain 359 prisoners, who had been longer than 2 months in confinement.

These 359 prisoners presented

88 cases of cholera	= 24.5 per cent	} 58.1
30 " " choleraic diarrhœa	= 8.3 "	
91 " " diarrhœa.	= 25.3 "	
52 deaths	= 14.5 "	
150 not attacked	= 41.9 "	

It is perfectly evident, that the duration of imprisonment has not exercised the slightest influence.

Dr. Berr has come in a somewhat different way to the same result as I have. He divided the prisoners into several groups according to the length of imprisonment, and regarded only the general rate of sickness and deaths. His results are as follows.

- 1) Less than 6 months in confinement, 350 prisoners.
Of these 190 = 55 per cent were attacked
51 = 15 " died.
- 2) From 5 months to 1 year in confinement, 110 prisoners.
Of these 65 = 59 per cent were attacked.
18 = 16 " died.
- 3) From 1 to 2 years in confinement, 41 prisoners.
Of these 25 = 61 per cent were attacked.
11 = 27 " died.
- 4) From 2 to 3 years in confinement, 18 prisoners.
Of these 14 = 77 per cent were attacked.
3 = 17 " died.
- 5) More than 3 years in confinement, 3 prisoners.
Of these 2 = 66 per cent were attacked.
— = — " died.

This comparison would seem to indicate that the duration of imprisonment had after all some influence, when it had lasted more than 1 year, for although it is true the rate of sickness in the 3rd division from 1 to 2 years is not materially higher than that of the two previous groups, yet the mortality is very decidedly so.

However this increased mortality may not be solely dependent on the duration of imprisonment, as other circumstances may have also had some influence, which is especially evident when we examine the mean age. If we investigate the age of the 41 prisoners of this third group, it appears that the greater number of them were advanced in years. The mean age of this group amounted to 37 years. There were 14 individuals among them 40 years old and upwards. The mean age of 37 is close upon 40. The comparison above at page 46 on the influence of age shows, that the mortality begins to increase considerably after 40, so that at all events not only the period of confinement, but also the high age has contributed to increase the mortality in this group of 41 prisoners, who had been 1 and 2 years in confinement.

The influence of locality on this group must also be taken into account.

That the duration of imprisonment cannot per se increase the mortality, is evident from the fact, that the 18 prisoners, who had been even more than a year, who had been 2 and 3 years in confinement, exhibited a mortality of only 17 per cent, which is not materially higher than that among those who had been confined less than 6 months and up to 1 year.

INFLUENCE OF BODILY STATE.

There is a regulation in the Bavarian prisons, that every new-comer is to be medically examined, and his bodily condition inscribed in one or other of 3 classes, feeble, tolerable and robust. The diagnostic features of these 3 conditions employed by Dr. Berr were as follows:

- 1) feeble muscular tone, anæmia etc., — feeble.
- 2) hernias, tumours, tuberculosis or other organic defect, the individuals being in other respects above class I — tolerable.
- 3) The absence of these signs — robust.

Defects in the limbs or organs of sense which occurred in about 20 cases, when the degree of resistance to disease or its course and issue would not seem to be influenced thereby, were not taken into account.

Dr. Berr counted among the 522 prisoners placed under his medical care

306 robust	= 58.6 per cent,
184 tolerable	= 35.2 „
32 feeble	= 6.2 „
Of the robust	171 = 56 per cent were attacked.
41	= 13 „ died.
Of the tolerable	111 = 60 „ were attacked.
35	= 19 „ died.
Of the feeble	17 = 53 „ were attacked.
7	= 22 „ died.

I have pursued these three classes somewhat more in detail in the group of 163 prisoners who had been only 2 months and under in imprisonment. Among these there were

107 robust	= 65.8 per cent,
48 tolerable	= 29.4 „
8 feeble	= 4.8 „

Among the 107 robust were

23 cases of cholera	= 21.5 per cent,	} 48.6
8 „ „ choleraic diarrhoea	= 7.5 „	
21 „ „ diarrhoea	= 19.6 „	
20 deaths	= 18.7 „	
55 not attacked	= 51.4 „	

Among the 48 in tolerable health there were

15 cases of cholera	= 31.2 per cent,	} 66.6
5 „ „ choleraic diarrhoea	= 10.4 „	
12 „ „ diarrhoea	= 25.0 „	
9 deaths	= 18.7 „	
16 not attacked	= 33.4 „	

Among the feeble there were

2 cases of cholera	= 25.0 per cent.	} 37.5
— „ „ choleraic diarrhoea	= — „	
1 „ „ diarrhoea	= 12.5 „	
2 deaths	= 25.0 „	
5 not attacked	= 62.5 „	

An essential difference does not therefore exist between these three classes, only the deaths show a preponderance among the feeble, and this result obtains whether we consider all the prisoners together as Dr. Berr does, or only those who had been but 2 months in imprisonment.

INFLUENCE OF PREVIOUS DISEASES.

It has been already mentioned, that the state of health in the prison could not be called good in the half year preceding the epidemic. At the time of the outbreak of the cholera epidemic 60 other prisoners entered, who had been treated for scurvy partly as in-patients, partly as out-patients in the course of the summer and autumn. These scorbutic patients now exhibited a strikingly higher rate of sickness and mortality compared with the other prisoners, as appears in the two following lists, the one (a) relating to occupation, the other (b) relating to dormitories.

Cases of Scurvy treated in and out of Hospital from May to November 1873, arranged

a) according to occupation:

- 1 under arrest.
- 1 Baker.
- 2 Brushmakers.
- 19 Spectacle-makers.
- Farm-labourer.
- 1 Gardener.
- 3 Glove-makers.
- 1 Domestic Servant.
- 2 Lithographers.
- 4 Smiths and Locksmiths.
- 16 Tailors.
- 4 Joiners.
- 6 Shoemakers.
- 2 Rope-makers.
- 5 Spinners and Knitters.
- 10 Straw-workers.
- 1 Washer.
- 12 Weavers and Winders.

b) Relation of cases of scurvy to dormitories.

No. of Cases of Scurvy	Dormitory No.	THE SCORBUTIC SUBJECTS PRESENTED				
		Cholera	Choleraic Diarrhoea	Diarrhoea	Deaths	Not attacked
7	32	1	1	1	1	4
12	39	1	—	6	1	5
3	41	1	—	1	—	1
5	48	—	—	1	—	4
3	56	1	—	1	—	1
6	64	3	1	1	2	1
4	67	3	—	1	2	—
6	70	4	—	—	4	2
2	80	1	—	—	1	1
2	82	1	—	—	1	1
2	83	1	1	—	1	—
7	91	1	3	—	—	3
12	94	4	—	2	—	6
7	97	3	—	—	3	4
4	98	2	1	—	1	1
4	99	4	—	—	4	—
3	Hospital	2	—	—	2	1
1	Arrest	—	1	—	—	—
90		33	8	14	23	35
expressed in percentage						
		36.6	8.8	15.5	25.5	38.8
Percentage among all prisoners						
		24.5	8.2	23.9	15.9	43.3

This table of scorbutic patients leads us to the further enquiry, whether the remarkably severe visitation of certain departments of labour or localities during the course of the epidemic may have been dependent on the fact that the attacked and deceased prisoners in question included a more than average number of such, as had formerly suffered from Scurvy. The investigation however gave a negative result in every respect. I will notice a few classes for the sake of example.

Twelve of the 30 tailors, who slept in dormitory No. 39, formerly had scurvy, and only 1 was attacked with cholera and died, whilst 4 out of 6 scorbutic subjects in room No. 70 were attacked with cholera and all died.

It is also interesting, to remark the influence of the epidemic upon the scorbutic subjects among the spectacle-makers in the dormitories Nos 91 and 94. There were 7 scorbutic subjects in the but slightly visited room No. 91, of whom only 1 took the cholera, whilst 4 of the 12 scorbutic spectacle-makers in the more seriously affected room 94 were attacked with cholera.

Only 3 of the joiners in dormitory No. 70, who came off the worst of any, had previously had scurvy. Two of these were attacked with cholera and died, whilst the remaining 9 deaths among the joiners affected individuals, who had not previously suffered from scurvy.

However much previous attacks of scurvy predisposed to Cholera, the influence of locality was still always at work to make the scorbutic more prone to the disease than the non-scorbutic. Had the 12 scorbutic tailors been in dormitory 70 instead of dormitory 39, they would in all probability have presented more than 1 attack and 1 death.

With regard to the increased individual tendency to cholera after previous attacks of scurvy one observation is well worthy of attention, which Dr. Berr makes in his excellent account of the local epidemic in this prison presented to the Ministers of Justice and of the Interior. In the year 1854, when the house of correction at Munich was also attacked quite at the conclusion of the epidemic, 152 cases of scurvy had been under treatment during the previous summer, and many of these persons were afterwards affected with and died of cholera.

INFLUENCE OF NURSING AND TREATMENT ON CHOLERA PATIENTS.

The establishment has one medical officer, Dr. Berr, who has held the appointment for 7 years.

One overseer and in addition 2 prisoners are generally employed as attendants on the sick in the hospital. It is self-evident that this staff of attendants proved insufficient, when the epidemic assumed such large dimensions. — Dr. Berr remained day and night at his post, till he broke down under the burden of his work on December 8th.

Dr. Klinger, medical referee to the Minister of the Interior, and councillor Petersen, prison referee in the ministry of justice, had hastened to the seat of calamity from Munich on December 4th armed with full power to at once make every possible arrangement to alleviate the distress and calm the prison population. It can be imagined what sensation must have been aroused among the prisoners, when this crowd of severe attacks and rapid deaths suddenly set in. The majority of the prisoners at Laufen were only condemned to a few months' imprisonment, and they had to forfeit their lives in such numbers.

The behaviour of the prisoners might at last be called exemplary, but it was only the consequence of the exemplary conduct of the doctor, director, clergyman, officials and overseers, as well as of the cooperation of the ministerial commissioners. The impossibility of their discharge was made clear to the prisoners, some divisions having thought they were justified in demanding it, all possible assistance and relief were assured them, they were visited and talked with more attentively, and allusion was made to the armed guard, who would be summoned only with reluctance to employ violence, but who would finally do their duty without reserve. And thus the prisoners remained perfectly quiet, half paralyzed by fear, half yielding to necessity. Only those who had just served their time, could not be detained an hour longer.

Dr. Berr received 2 medical students from Munich, Messrs Schinke and Schülein, to act as assistants, of whose services he speaks in terms of great commendation. Six trained hospital attendants came from the order of brothers of mercy at Neuburg on the Danube, and 6 overseers and 20 prisoners likewise volunteered their services as nurses. The district surgeon of Laufen, Dr. Loder, took Dr. Berr's work during his week's illness.

The persons occupied with the care and treatment of the cholera patients almost all enjoyed immunity. Dr. Berr manifested no symptoms whatever of cholera, but those of cerebral congestion in consequence of over-exertion and night-watching. The two assistants remained well. The clergyman also Herr Seybold and Dr. Loder were not taken ill. The 6 attendants from the order of brothers of mercy were also exempt. The overseer in the sick department Georg Raab remained well in spite of very great exertion, excepting an attack of diarrhoea, which did not affect him till December 10th and lasted until the 14th, but did not compel him to be absent from duty. The 2 permanent hospital attendants chosen from among the prisoners remained well likewise.

Only 3 fell ill out of 20 prisoners who voluntarily undertook the duty of nursing at various periods of the epidemic, 2 being affected with transient diarrhoea treated out of hospital, and 1 with choleraic diarrhoea which terminated fatally. The latter (Deisinger, 40 years old, unmarried rope-maker) died according to the account of Dr. Berr less of choleraic diarrhoea than of exhaustion: he was self-sacrificingly active and conscientious in nursing his sick fellow-prisoners, and Dr. Berr felt it his duty to make special mention of this self-sacrifice in his report.

ACCOUNT OF THE MEASURES ADOPTED.

I shall borrow something on this head from the report of Dr. Berr, to furnish a proof, that the epidemic did not manifest such an intensity, because anything was neglected in this case, that had been done in other analogous cases, and which it might be assumed would have hindered the spread of the disease here also, if it had been done.

The patients were constantly kept apart from those who remained well. When the hospital no longer sufficed for the reception of the patients, the cell-prison was emptied and transformed into a sick station, for which the broad high corridor provided with a sky-light and running between both rows of cells was particularly applicable.

When this place also no more sufficed, the prison chapel situated between the hospital and cell-prison was occupied with patients, by which means 50 more beds were obtained for them. The chapel was it is true somewhat difficult to warm, but the room was bright and airy.

As soon as possible Dr. Berr established two subordinate departments, a quarantine department for convalescents, for which he chose rooms 56 and 57, then a probationary department for those cases the specific nature of which was still doubtful, or their intensity but slight (Diarrhoea station). For this purpose he employed rooms 98 and 99.

Sixteen persons under hospital treatment for diverse maladies were placed at the very outbreak of the epidemic in room No. 102, which had previously served as a dining-room for the overseers, and none of these took the cholera.

With the assent of the minister the following additional measures were put in force:

- 1) Regular allowance of coffee, afterwards of beer also $\frac{1}{2}$ liter per head per day.
- 2) Double the ordinary weekly allowance of meat for dinner.
- 3) Improvement of the morning meal (soup).
- 4) Half an hour's exercise in the open air in the morning and afternoon, taking with them their blankets out of the bed-rooms.
- 5) Diminution of working hours by $1\frac{1}{2}$ hours a day in favour of sleep.
- 6) Allowance of drawers and flannel jackets.
- 7) Allowance of claret and cigars for the overseers.

Whatever was necessary for the sick department, Dr. Berr immediately requested, and was most liberally and powerfully supported by the government.

The disinfection of the closets had been in full operation since August, and I shall speak more particularly on this subject hereafter.

Moreover another special precaution had been adopted since midsummer in consequence of tidings from Munich, viz all convicts on their arrival had to use a weak solution of carbolic acid to wash their hair etc. in taking the cleansing bath which every new comer has to undergo. The same measure was also adopted when any prisoner was discharged from the establishment during and after the epidemic.

Intense fumigation with chlorine was carried out in the dead-room. The bodies were buried within 24 hours after a careful autopsy, and the coffin was covered with chloride of lime after being deposited in its place. All large funeral processions were forbidden by the police and the time of burial either early in the morning or late in the evening.

All the rooms in the establishment were fumigated with sulphur (12 grammes of sulphur to 1 cubic metre of air) from December 5th to 19th.

The linen of those affected with less acute types of disease was also completely separated from that of the healthy, treated first with strong lye, and afterwards put in solution of carbolic acid. The department of washers was not more affected than the other prisoners.

Bed clothes, bed-stead and linen of those who had died of cholera were rendered innocuous in the most effectual manner. Everything was consumed in an ever burning fire in the hospital yard. The prisoner who had to keep up this fire, remained well.

DISSEMINATION OF CHOLERA OUTSIDE THE CIRCLE OF PRISONERS IN THE ESTABLISHMENT AND IN THE TOWN OF LAUFEN.

Besides the persons, who had to deal with the cholera patients, there were others also who came in manifold and uninterrupted, partly direct, partly indirect contact with the prisoners and the establishment, so that it is of importance to ascertain, how far the malady spread to them also.

First of all there follows a

LIST OF OFFICERS AND ATTENDANTS IN THE PRISON AT LAUFEN.

Current No.	NAME AND STATION	FAMILY				DWELLING	REMARKS
		Single	Married	Widower	Children		
1	Schicker, Georg, Director	.	1	.	2	Official residence between dead-house of establishment & barrack	Plan No. I
2	Braun, Otto, Manager	.	1	.	4	Edlmann, ironmonger, Rupertus-Platz	
3	Berr, Dr. Alois, Surgeon	.	1	.	1	80 Rupertus-Platz, lower town	
4	Seybold, Alois, Chaplain	1	.	.	.	Burgfeld, parish of Heining	Choleraic diarrhoea, Dec. 9th—13th
5	Demeter, Ludwig, School-master	1	.	.	.	Lohn, soap-boiler, Schranken-Platz	
6	Scherer, Josef, Bookkeeper	1	.	.	.	Rupertus-Platz	
7	Barthel, Heinrich, Clerk	.	.	1	1	No. 34 an der Salzach	Cholera, Dec. 6—9, died
8	Brucker, Andreas, Clerk	1	.	.	.	No. 8 an der Stadtmauer	
9	Eimerich, David, Porter	.	1	.	4	In the establishment	
10	Schulz, Anton, Workmaster	.	1	.	3	106 Schranken-Platz	Diarrhoea and interruption of duty, Dec. 5—20
11	Mildhammer, Ludw., Head overseer	.	1	.	.	{ 105 Schranken-Platz. Room No. 49 } { in the establishment }	
12	Neubauer, Ludwig, House-steward	.	1	.	4	106½ Tauben-Gässchen	
13	Mehlem, Josef, Overseer of joiners	.	1	.	2	{ 93 Schranken-Platz. Room No. 69 } { in the establishment }	Not on duty during the epidemic on account of gastric fever
14	Reitberger, Josef, Overseer of locksmiths	.	1	.	.	{ Dax, hat-maker, No. 44. Room No. 65 in the establishment }	
15	Flechtner, Ernst, Overseer of weavers	.	1	.	3	20 Obslaufen. Cell-prison	

Current No.	NAME AND STATION	FAMILY				DWELLING	REMARKS
		Single	Married	Widower	Children		
16	Eckert, Jacob, Overseer of spectacle-makers	.	1	.	2	{No. 77 Lower Town. Room No. 92 in the institution	
17	Raab, Georg, Overseer, in sick department	.	1	.	1	{Magon, baker, No. 5. Prison Hospital	Diarrhoea Dec. 10 to 14, out-patient
18	Uebel, Andreas, supernumerary overseer	.	1	.	1	Dax, hatter, No. 44. Cell-prison	Afterwards took the place of Flechtner (ill) among the weavers
19	Treiber, Nikolaus, Overseer of farm-labourers	.	1	.	1	{Obslaufen No. 9. Room No. 65 in the institution	Colic. Dec. 5th
20	Zimmermann, Georg, Overseer of tailors	.	1	.	.	{Pöllner, farmer, No. 12. Room No. 40 in the institution	Choleraic diarrhoea at his lodging Dec. 8-12, absent from duty
21	Kraus, Ernst, Overseer of shoe-makers	.	1	.	3	{Sulzmeier, inn-keeper, No. 89. Room No. 92 in the institution	
22	Renz, Adolf, Overseer of gardeners	.	1	.	2	{Bründl, butcher, No. 28. Room No. 92 in the institution	Colic Dec. 5th
23	Müller, Karl, Overseer of washers	.	1	.	1	Sommerreder, inn-keeper, No. 34. Room No. 96 in the institution	
24	Gündel, Philipp, Overseer of straw-workers	1	.	.	.	Room No. 65 in the institution	Colic Dec. 5th
25	Rachel, Georg, Overseer of brush-makers	1	.	.	.	Room 101 in the institution	
26	Müller, Konrad, supernumerary overseer	1	.	.	.	Room 101 in the institution	{ Employed in the specific sick department room 56.
27	Attenberger, Josef, formerly overseer of bricklayers	1	.	.	.	Cell-prison	{ Convalescent from pleuro-pneumonia, absent from duty at critical time
28	Müller, Georg, Overseer of spectacle-makers	1	.	.	.	Room 101 in the institution	
29	Haslauer, Peter, Overseer in cell-prison	1	.	.	.	Room 40 in the institution	{ Attendant on sick in cell-prison from Dec. 3rd
30	Rudroff, Johann, Overseer of glove-makers & spinners	1	.	.	.	Room 65 in the institution	
31	Wagner, Peter, Overseer of rope-makers	1	.	.	.	Room 101 in the institution	Cholera Dec. 5th. died
32	Mall, August, Overseer of cleaners & messenger	1	.	.	.	Prison Hospital	Cholera Dec. 8th. died
33	Fenzl, Alois, Overseer employed in the office	1	.	.	.	Room 96 in the institution	Cholera Dec. 4th. died
34	Matheis, Paul, Overseer of straw-workers	1	.	.	.	Room 69 in the institution	

34 men therefore came in direct contact with the prisoners, whilst
18 women, and
25 children were in intimate relationship to these 34 men

altogether 77 persons.

OVERSEERS.

The overseers are partly married, partly single, must however with the exception of the house-steward be all regarded as living in the establishment, as even the married ones spend only a few hours daily with their families which live in the town, and the remaining time in their respective departments and the nights in the overseers' rooms. According to the report of the director the married overseers are from $\frac{1}{4}$ to $\frac{1}{2}$ hour at breakfast, dinner and supper, then every second holiday from 1 p m to 10 p m with their families.

Nine overseers' rooms are to be seen in the plans of the main building:

Nos. 40 and 49 on the first floor;

Nos. 65, 69, and 74 on the second floor, and

Nos. 81, 92, 96 and 101 on the third floor.

Besides these there is an overseer's room in the cell-prison near the chapel, and one in the hospital.

Two overseers (20 and 29 on the list) slept in No. 40, of whom one was attacked with choleraic diarrhoea on December 8th and treated at his town lodging.

The head-overseer (11) slept in No. 49, he was attacked with cholera on the 6th, removed to his dwelling in the town and died there in the typhoid stage of cholera on the 9th.

Four overseers (14, 19, 24 and 30 on the list) slept in No. 65; 2 of these, 19 and 24 felt unwell with colic on December 5th.

Two (13 and 34 on the list) slept in No. 69, one married, the other single. The married overseer was attacked with diarrhoea on the 5th, was obliged to give up work and remained in his dwelling in the town until his complete recovery on December 20th.

The overseers' rooms Nos. 74 and 81 were not occupied at the time of the epidemic.

Three (16, 21 and 22 on the list) slept in No. 92. Only one of these overseers complained of colic on December 5th.

Two overseers (23 and 33 on the list) slept in No. 96. One of them (Fenzl 33) was the first case of cholera among the overseers, he was attacked on December 4th and died in the comatose stage after 10 hours' illness.

Four overseers (25, 26, 28 and 31 on the list) slept in No. 101. Of these Wagner (31), overseer of the rope-makers was attacked with cholera on December 5th, was removed like Fenzl to the cholera hospital (formerly plague-house, now dead-house with separate sick-room in connection with it) erected by the town-council in the suburb of Obslaufen, and died there on December 6th. Wagner came in contact with the body of Fenzl, and believed he caught the cholera in this way.

Nos. 15, 18 and 27 on the list occupied the overseers' room in the cell-prison near the chapel. 15 and 27 are not to be reckoned, as they were both outside the institution in the town hospital on account of illness at the critical time. The overseers' room in the hospital was occupied jointly by Nos. 17 and 32. Mall (32), messenger was attacked with cholera on December 8th and died on the 9th; Raab (17) overseer in the sick department, was attacked with diarrhoea on December 10th, from which he suffered until the 14th, but without giving up his work.

Only 22 of the 24 overseers are to be taken into account, because 2 (15 and 27) were absent, indeed to establish perfect uniformity of circumstances, Neubauer (12) the house-steward must also be deducted, as he did not pass day and night in the establishment like the other overseers, but only the day like the officials and other attendants. Strictly speaking therefore only 21 overseers are to be reckoned.

Among these there occurred:

4 cases of cholera.	= 19.0 per cent	} 46.5
1 case of choleraic diarrhoea	= 4.7 "	
2 cases of diarrhoea	= 9.5 "	
3 cases of colic	= 14.3 "	
4 deaths	= 19.0 "	

Whether now we include the 3 cases of colic, which all happened on December 5th the day on which the epidemic reached its maximum, among the specific attacks or not, the overseers when contrasted with the prisoners present on an average a much lower rate of sickness, on the contrary the mortality from cholera is considerably higher than among the prisoners.

On making further investigations we see but this additional fact, that essentially the same causes, the same opportunities for infection must have operated in the case of the overseers as in that of the prisoners. The first case among the prisoners came out of room 96 on the third floor, which formed part of the east wing of the building, in which wing and in which story (room 99) the cholera began also among the prisoners and reached its highest intensity just one story below 96 among the joiners in No. 70.

The second case of cholera (Wagner 31) came out of room No. 101 on December 5th, directly adjoining dormitory No. 99, in which the first case of cholera in the institution (Rosskopf) had occurred on November 29th.

The third case of cholera (Head overseer Mildhammer) came out of room 49 on December 6th, which occupies the same place on the first floor, as 101 on the third. The corresponding room No. 74 on the second floor was not occupied.

The fourth case of cholera among the overseers happened lastly on December 8th and came out of the overseers' room in the hospital.

Each of the two primary centres of infection, the east wing of the main building as well as the hospital, play therefore as conspicuous a part in the occurrence of acute attacks among the overseers, as among the prisoners.

The first and so rapid case among the overseers (Fenzl, 33, room 96) shows clearly, that it is not necessary to have come in close contact with cholera patients and prisoners beforehand. His occupation differed from that of the ordinary overseers, he did duty not with the prisoners, but in the director's office, where he was occupied the whole day with writing. Karl Müller (23), now head-overseer, at that time overseer of the washers, was joint occupant of the room 96 and remained entirely free from disease. The fact therefore, that the second overseer who took the cholera (Wagner, 31, from room No. 101) came in contact with the body of Fenzl, loses all weight as a proof of the nature of the infection. Looking to his occupation Fenzl might have laid claim to immunity.

The whole body of officials and their families remained free from cholera, and Fenzl was occupied the whole day in the offices of the establishment, but his dormitory seems to have exercised a decisive influence.

The case of choleraic diarrhoea affecting the overseer Zimmermann (20), room No. 40, which was treated outside the institution, and that of diarrhoea affecting the overseer Mehlem (13), room No. 69, will be considered in speaking of the influence of the epidemic on the town of Laufen.

OFFICIALS AND OTHER SERVANTS OF THE ESTABLISHMENT AND THEIR FAMILIES.

Unmistakable as it is, that the overseers participated in the attacks of cholera, or generally in the epidemic affecting the prisoners among whom they lived, it is just as clearly evident in the case of the officials and other servants of the institution, who excluding the porter lived outside the institution, that the epidemic found its limits here. The porter's dwelling is in the south-western part of the main building. Of the persons employed in the secretary's office Brücker the clerk (No. 8 on the list) suffered from choleraic diarrhoea and was treated at his lodgings. No further attacks followed this one.

MILITARY DETACHMENT TO GUARD THE PRISONERS

The soldiers requisite for guarding the prisoners are quartered quite near the establishment, adjoining it indeed, as is evident in ground-plan I. At the critical time the guard consisted according to the communication kindly furnished by Lieutenant Max Büller, of 3 officers, and 67 non-commissioned officers,

musicians and privates of the 1st infantry regiment (König in Munich). Every day 1 non-commissioned officer, 1 lance-corporal and 12 men occupied the guard-house in the west wing of the main building (see Plan III). There were 2 day watches, for which 6 men were also requisite. The guards were relieved from the guard-house of the institution. No watch was stationed in the interior of the building in corridors or in rooms, but all in the open air, in court-yards etc.

The guard-house in the establishment was regularly occupied until December 6th. When however the epidemic assumed such unexpected dimensions in the house on December 4th and 5th, the commandant in order to secure the troop from infection considered it his duty to make a change and have the watch relieved direct from the neighbouring barracks. The guard-house in the institution was not left and evacuated until the evening of December 6th.

Strange to say the cholera was not transmitted to the soldiers. During the whole course of the epidemic only 2 soldiers suffered from some slight gastric disturbance, for which they were subjected by Dr. Berr to merely prophylactic treatment (2 days absence from duty and cholera drops *Tinctura Valerianæ* with *Tinctura Thebaica*). The commandant provided also warm clothing (flannel waistcoats, drawers, worsted socks) and good shoes, as well as warm soup in the morning and evening, strictly enforcing cleanliness, disinfection of privies and having the rooms at the barracks several times fumigated with sulphur.

POPULATION OF THE TOWN OF LAUFEN.

It is of the greatest interest to observe the effect produced on the town of Laufen by the infecting focus in its midst. The consternation and horror in the whole town can be easily imagined. The outbreak of cholera in the town also was daily expected, for which apprehension there was all-sufficient reason. The number of officials and servants living in different parts of the town outside the institution, who were obliged to keep up a regular daily intercourse with it, amounted to 22, the number of members in their families to 53. The danger increased, when the overseers began to fall ill, of whom the married ones had intercourse with their families in the town. When I arrived in Laufen, I inquired immediately, whether any cases of choleraic or simple diarrhoea had yet occurred in the houses, in which overseers and officials of the institution lived. The absence of all symptoms of this kind led me to entertain the hope, that the town would be spared, and I expressed this view also in a sitting of the board of health at Laufen, to which the chairman district-surgeon Dr. Loder had invited me. All precautionary measures were moreover energetically and carefully put in force to avert such a sad event. And in reality this heavy cholera cloud rising from the institution passed over the alarmed town without letting anything drop, without committing further havoc. One sole exception can be proved, but even this proves with remarkable distinctness the very sharply defined local limits of the explosive outbreak in the establishment. (See dwellings of the officials and overseers in the town in the map of Laufen.)

I was highly and disagreeably surprised, when Dr. Loder, the district-surgeon, informed me on December 15th at 8 a. m. that he had now 2 undoubted cases of cholera under his care in the town, the subjects being 2 children, both of which would end fatally and which were moreover in a house occupying a very bad situation. In the night between December 14th and 15th Therese Ensmann, 2½ years old, and Marie Ensmann, 1 year 8 months old, children of a saddler, were attacked with cholera. Dr. Loder gives the following account of the case: „The parents and their two children inhabited the first floor of the house No. 27 in Jägerwirths-Gässchen with a south-west aspect. The number of dwellers in this house amounted to 9 persons at that time. The situation of the house is highly unfavourable; the street itself is narrow, generally very dirty, the air rendered impure by the effluvia from a slaughter-house opposite and its dung-heap, on which animal excrements are frequently suffered to accumulate in a highly improper

and often culpable manner. All the inhabitants of the house and especially the Ensmanns had always been notorious for great uncleanness in their households; in addition to which there was great poverty in the Ensmann family, bad sometimes unwholesome food, e. g. the frequent consumption of sheep's blood fried in rancid fat and so on."

When I betook myself to this house with Dr. Loder, Therese was already dead, and Marie lay in articulo. Both children died 14 and 13 hours after the commencement of the attack with all the symptoms of cholera. Frau Ensmann seemed to be still well. We spoke to her and learned, that she had nursed Mildhammer the head-overseer of the prison, whilst he was lying ill with cholera in his house 105 Schraffen-Platz and where he also died. She cleaned Mildhammer's bed-clothes and linen and after his death his room also, as well as all objects, night-chair etc. used by him during his illness.

Although the nursing of cholera patients in the prison itself, as I have shown above, did not produce any baneful influence whatever, the intercourse between Mildhammer and the woman Ensmann would always have been sufficient to explain the infection of Frau Ensmann, but not that of her children. The woman assured me that her children had never been in Mildhammer's dwelling, and that she had not brought them any victuals etc. from there with her. I learned at last on making minute inquiry, that she had been presented with a jacket worn by Mildhammer and taken it home with her. I wished to see the jacket, but the woman told me, it was hanging at the time in the store-room. As one of her children was lying dead and the other moribund, I left the house again, to make further inquiries at a more convenient season. Frau Ensmann was however attacked with cholera in the night between December 15th and 16th and died in 10 hours.

After the death of Frau Ensmann the house was emptied, disinfected and fumigated with sulphur.

No further cases occurred in Laufen. This isolated case of importation from the institution into the dwelling of Mildhammer, and from there into the dwelling of Ensmann is rather puzzling for those who do not credit the ordinary doctrine of contagion, which would apply very well to this case, but would not apply to all other cases: but to assume its correctness merely because it would serve just here to explain the facts, is more than I can ever resolve to do in the face of so many other facts. I have therefore taken much pains to ascertain, in what way the woman Ensmann could have conveyed the cholera in the institution to herself and her children.

The house, in which Mildhammer lived, is in Schraffen-Platz, being one of a row of houses fronting this square but opening behind into the so-called Tauben-Gässchen opposite the sick department of the prison. This house No. 105 was at that time inhabited by 14 persons, who all except Mildhammer remained perfectly free from cholera as well as choleroïd disease.

Mehlem the married overseer of the joiners, who was attacked with violent diarrhœa on December 5th and was treated at his home, lived also at 98 Schraffen-Platz. The cholera, of which Frau Ensmann and her two children died, was certainly no other than that of which Mildhammer also died. If now Mildhammer produced infection solely in virtue of his malady, why did not Frau Ensmann and her children produce further infection? Sporadic infection proceeding from a focus of disease seems to me most simply explained by the assumption, that the cholera-patient brings so much with him here and there from an infected spot in some garment or otherwise, as suffices to set up infection in other spots, which however has no further consequences, if the new spot does not possess all conditions favourable to the increase and propagation of the transported infecting material, in which case the latter serves only as the germ for a new seed.

I assume now by way of preliminary, that Frau Ensmann and her children were infected by an object, to which infecting matter from the institution adhered, and I have taken much pains to come across such an object. But all my endeavours have been in vain.

As unfortunately I could no longer speak to Frau Ensmann, I applied to Frau Mildhammer. She however answered all my questions with great reserve, it appeared to me as if she feared I wished to bring

out, that she might have caused quite unintentionally it is true the death of Frau Ensmann and her children. I afterwards persuaded Herr Schicker the director to investigate the matter, and his confidential inquiry elicited the following story: Frau Mildhammer had taken a woollen house-jacket which however her husband had never worn at the institution, and one of his recently washed shirts out of the wardrobe and given them to the woman Ensmann.

I was afterwards informed too, that Frau Ensmann had received a pillow on which Mildhammer had lain. Herr Schicker had the kindness to make inquiry about it and to communicate the following particulars to me: „No pillow or anything else, except what he had on him on leaving the institution, had been taken out of the establishment into his private dwelling during the whole period of his illness nor afterwards. Nor had his widow given away any pillow from the bed of her husband, but when Mildhammer was already in the dead-house, the man who laid him out sent to Frau Mildhammer for a pillow, that the body might lie higher. The widow hereupon sent Frau Ensmann with a pillow from Mildhammer's bed to the dead-house and after the funeral Frau Ensmann fetched it again from the dead-house. This pillow has been hanging ever since in Frau Mildhammer's attic.“

No more facts requiring investigation presented themselves to me, and Frau Ensmann has taken the secret with her to her grave. I need hardly mention, how important it is in investigating the etiology of cholera, that just these isolated cases of infection, proceeding from an infecting focus situated elsewhere, should in future be examined with the greatest care. I revert here to a doctrine already often expressed by me, viz, that the occurrence of cholera on board sea-vessels gives the best prospect of success in this inquiry.

With regard to the foregoing case I will only draw attention to the intervals of time between the attacks. Mildhammer was attacked in reality in the institution on December 5th, but the more acute symptoms did not appear till the 6th and he died on the 9th. Frau Ensmann and Frau Mildhammer nursed the patient by turns from December 6th. The children of Frau Ensmann were attacked on December 15th, Frau Ensmann herself on December 16th. From December 6th to 16th are 11 days, from December 9th to 15th 7 days.

Before discussing the question as to the further dissemination of cholera from the powerful focus of infection which the prison presented, beyond the limits of the town of Laufen, I have to consider some other circumstances in the prison itself, which have some relation to the intensity and disseminating power of the disease. The treatment of the excrements occupies the first place here.

INFLUENCE OF DIFFERENT KINDS OF PRIVIES.

I have already communicated the more essential particulars relative to the nature of the privies in my description of the prison at Laufen in the introductory chapter. The only remaining matter of interest is to learn what relation there was between the different departments of prisoners so variously affected and the different kinds of privies.

First of all an attempt can be made to make a division corresponding to the two chief systems, which were and are still in use, the cess-pool and the tub system. A great difficulty however at once springs up rendering a perfect comparison an impossibility, viz, the circumstance, that the different departments very often employed the one system by day and the other by night. For instance all the shoemakers slept on the third-floor in the rooms Nos 80, 82, and 83, and used only tubs., which were emptied every

morning, as long as they remained in the dormitories; they all worked however on the first-floor in the workroom No. 45 and the small adjacent room No. 46, and used by day the privy No. 42, which is entered from the workroom, and is connected with the cess-pool of the main building on the east side. Is now the enormously high rate of sickness among the shoemakers (over 70 per cent) to be attributed to the tubs of the dormitories, or the privies of the workroom?

Most people would be still inclined in the present day to consider the cess-pools with their decomposing contents worse than the fosses mobiles which were changed every day. The three large privies in the main building connected with workrooms and dormitories and passing through all the stories is an arrangement, which quite apart from cholera is certainly not to be commended from a general hygienic point of view. The greater part of the emanations from the cess-pools ascended into the house through numerous (52) privy-holes during the greater portion of the year, and first of all indeed into the dormitories and workrooms. Hitherto only a faint idea had been formed of the quantity of matter passing out into the air from full cess-pools, it was merely known, that there was a bad smell; since however Dr. Erismann at my suggestion determined this effluvium quantitatively also with tolerable exactness in the hygienic institution at the university of Munich, we have been astonished, nay actually horrified at the matters which are poured into a house from a full cess-pool 18 cubic metres in dimensions during 24 hours, even when only $\frac{1}{1000}$ of the contents of the cess-pool passes into the air; for this one-thousandth part comprises on an average not less than 18 kilogrammes of carbonic acid gas, ammonia, sulphuretted hydrogen and volatile compounds of carbon together, or almost just as many cubic metres in gaseous volume. Dr. Erismann's work on this subject is being printed and will shortly appear in the journal of biology.

As the iron privy pipes in the establishment, which it is true have a free opening above the roof, are not specially and constantly ventilated by fans or fires, the draught of air goes for physical reasons out of the closet-pipe into the interior of the house during the greater part of the year, namely as long as it or parts of it are warmer than the surrounding free air. The strength of the draught increases with the difference of temperature between the interior and exterior, and closing the aperture and door of the privy, and even opening a window in the privy furnishes only a very imperfect and slight protection against this constant current of gaseous impurity into the house. It might therefore be expected, that all the rooms, which were immediately connected with these privies ought to have exhibited many more cases of cholera and deaths than the rooms with tubs.

Although now a perfect comparison is not to be carried out for the reason above-mentioned, the occurrence of cholera and deaths in the different rooms of the establishment is still a very good field for the study of this important question. There are some departments among the prisoners, which only make use of tubs both in their workrooms and dormitories, and others which resort only to privies with cess-pools.

The prisoners undergoing solitary confinement had only the tub system, and they as is well known suffered hardly at all, only one case of death occurring among 35. This immunity cannot however be attributed to the influence of the particular system, as it continued for the most part even when 34 of them were distributed among the prisoners in ordinary confinement at the very worst period of the epidemic (the morning of December 4th) and were exposed like them to the influence of privies in dormitories and workrooms.

The rope-makers with one exception slept in room 98 on the third-floor, and worked either in the open air or in bad weather in the rope-makers' attic under the roof of the hospital. They had only tubs to make use of both in the dormitory 98 and in the rope-makers' attic. It might be pointed out, that only 3 cases of cholera and a single death had occurred among 22 rope-makers, although a greater number of cases of choleraic and simple diarrhoea took place, and it might seem natural to attribute this undeniable advantage to the fact, that they did not come in contact with the privies of the institution.

Apart from the fact, that the slight number of acute cases among the rope-makers might proceed from other causes, e. g. their prolonged stay in the open air, another department, which likewise used only tubs both in their workrooms and dormitories, exhibited quite the contrary result.

The department of washers is occupied during the day on the ground-floor in No. 15, the wash-house proper (20 men), and in No. 16, the mangling- and ironing-room (5 men) and 1 in the drying room on the under-ground floor, and slept until December 8th partly (16) in No. 56 on the 2nd floor, partly (10) in No. 97 on the third-floor. — The mean age of those in No. 56 is 30, that of those in No. 97 26. One of the two who died in No. 56 was 40 years old, the other 50. Although a great difference is observed between these two groups as regards the number of cases of cholera, 25 and 10 per cent, this difference is more than counterbalanced in the general rate of sickness by the greater number of cases of diarrhoea in the younger group, 44 and 70 per cent.

The department of washers had only tubs when at work in the day-time in Nos 15 and 16, the 16 men, who slept in dormitory No. 56 during the night also, whilst the 10 in dormitory No. 97 went to the adjacent privy No. 95 during the night. The group in dormitory No. 56 ought therefore to have had a decided advantage over those in No. 97, which was indeed shown in a smaller number of cases of diarrhoea, but also in a much greater number of severe cases. The 16 washers in No. 56 had 4 cases of cholera, of which 3 ended fatally, 2 cases of choleraic and 1 of simple diarrhoea. If the advantage of the tub system over the cess-pool system is to be measured by these facts, we shall be obliged to give the preference to the worse system. The attacks which befell the washers cannot, as indeed happens elsewhere, be attributed to their occupation, for it has already been proved above, that all the linen of cholera patients had been carefully and effectually disinfected, so that the washers had not suffered more than other departments. Moreover the temporary occurrence of attacks among them by no means favours the idea of a special or different mode of infection to that among all the rest.

The comparison between the department of shoemakers and that of brushmakers is of interest, these two groups being in so far opposite, that the shoemakers were exposed by day to the emanations from the eastern cess-pool (privy No. 42), and had only tubs in their dormitories, whilst the reverse obtained among the brushmakers, who used tubs by day, and were exposed by night to the emanations from the northern cess-pool (privy No. 62).

The locksmiths occupied a similar position to the brush-makers. In making this comparison some evidence might also be expected, whether the cess-pool emanation acted more injuriously during the work by day, or during sleep at night, in which latter case the brush-makers ought to have fared worse than the shoemakers. The relation is as follows:

Shoemakers*).				Brushmakers.	
Cholera	25	per cent,	} 77.5	33.3	} 77.2
Choleraic diarrhoea	7.5	„		3.3	
Diarrhoea	45.0	„		41.6	
Deaths	17.5	„		33.3	

We might easily be misled to draw the conclusion from these figures, that cess-pool emanations have no influence either by day or by night on the rate of sickness, but a very important influence on the severity of the attacks and consequently on the deaths: such a conclusion would correspond to many preconceived and current opinions.

A further investigation very soon teaches us however, how deceptive such solitary accidental coincidences may be, although they may very well serve to support here and there some one popular idea.

*) The two shoemakers in the hospital are not reckoned.

Besides the brushmakers other divisions also were equally exposed to the emanations from the northern cess-pool, e. g. the weavers in work-room No. 58 on the same floor, the tailors in work-room No. 38 a story lower through the medium of the privy in No. 36 and the straw-workers in dormitory No. 32, as well as the spectacle-makers a story higher through the medium of the privy in No. 85 both in their work-room No. 84 and in their dormitory No. 91. The tailors suffered remarkably little, and that very section of the spectacle-makers, which was exposed to the emanations from the northern cess-pool by day and by night escaped with remarkably mild attacks. Every one therefore, who imagines the mischief proceeded from the cess-pools and privies, must assume that the northern cess-pool contained least poison, and that the poison was concentrated principally in the eastern cess-pool, with which the shoemakers' workroom No. 45, and the joiners' dormitory No. 70 communicate.

He who imagines that a material influence proceeds from the cess-pools, is compelled to assume as the active cause of the higher mortality and rate of sickness not the northern cess-pool, because this cess-pool proved so favourable to the other departments, but only the eastern cess-pool, to the direct emanations from which however the brush-makers for instance were not at all exposed. The above-mentioned comparison therefore between the shoemakers and brush-makers furnishes no conclusion with regard to the question, how far the influence of cess-pool emanations acts more banefully during the night and during sleep, than during the day and during work.

The circumstance, that the iron privy-pipe is carried down from the first-floor to the cess-pool outside the building in the wall of No. 11 the brushmakers' workroom, makes no difference, as this pipe is quite compact and all around it dry. If thick iron and massive walls however allow perhaps just as many noxious matters to pass out of cess-pools into dwelling-rooms, as the open holes of privies, there will not indeed be in future any more occasion to resort too all kinds of closure, but everything had better be left open at once, as some trace will at last penetrate everywhere. Every limit to the localisation of an infecting material in a building, that is so manifestly expressed elsewhere, would be overthrown, if it were asserted, that the joiners, shoemakers and brushmakers had suffered more than the other departments in proportion as they were more exposed to the influence of the eastern privy. If it really depended upon this cause, the brushmakers who only communicated with the solid, fluid and gaseous contents of the eastern cess-pool through a partition of iron and stone, should at all events have been much less affected than the shoemakers, near whose workroom three open pipes opened into the privy, the door of which leading into the workroom not only closed very defectively and was very frequently opened and shut, but to which every individual betook himself several times daily to perform his natural functions and sat down over the open pipes. In reality however the brushmakers suffered even more than the shoemakers.

If now the germ of cholera is held to reside principally in the alvine evacuations, it must be admitted, at least in the preceding case, that these cholera germs reached all the cess-pools, for no cess-pool remained free from cholera evacuations. They must be assumed to be also equal in all other respects. As they are of equal size, their contents are also qualitatively quite equal. The nature of the excrements is dependent on the nature of the food. As the food of all the prisoners is the same, fœces and urine must also be the same. Since the investigations of C. Voit meat-fœces bread-fœces and fœces from other food can be distinguished very exactly from each other, but not joiners' fœces and tailors' fœces, when joiners and tailors have had the same food. It cannot therefore in any way be assumed, that the emanations from the eastern cess-pool could have acted differently to those from the northern and southern cess-pools.

Nor is it demonstrable, that the draught through the pipe from the eastern cess-pool was stronger than that from the northern and southern, indeed an observation made by Dr. Berr renders the contrary state of things the more probable of the two. At the critical time the north-west wind prevailed, which must have acted more on the northern than on the eastern cess-pool. If there had been an east wind, it might have been said that the eastern privies had more draught. The whole probability, that

the eastern cess-pool was more baneful than the northern, is consequently reduced to the matter of fact, that the eastern cess-pool is a part of the east wing, and the northern cess-pool situated near the north-west corner of the institution is a part of the west wing, and the east side and west side of the house have shown a difference in many other respects in the way in which they were attacked.

I have mentioned above, that the enormous mortality among the joiners might be due to the fact, that they alone remained day and night in the centre of the eastern wing, at night in No. 70, by day in No. 71, and I am doubtful if they would have shared the same fate, if they had been as constantly cooped up together in one and the same place in the western wing. They were actually exposed without interruption to the influence of one and the same part of the building, but not of one and the same cess-pool. At night they used the privies connected with the eastern cess-pool, by day on the contrary the privies No. 76, which belong to the southern cess-pool. It was the same thing also with a large portion of the straw-workers.

The straw-workers, who worked during the day in No. 72, slept for the most part (24) in the same dormitory No. 70 as the joiners, the smaller number (8) in the dormitory No. 97, which is a story higher, but directly above No. 70. These 32 straw-workers had the same privies by day and night as the joiners, and if this had been decisive, they ought to have been visited just as much as the unfortunate joiners. They had certainly a sick-rate of 50 per cent, but a death-rate of only 12½ per cent, whilst the joiners had one of 47 per cent.

The 8 straw-workers, who slept in room No. 97, fared comparatively much worse, than those (24) in No. 70, without our being able to attribute it to the influence of the privies. If it is asked, what advantage these straw-workers had over the joiners, I can allege nothing, except that they did not live day and night in the centre of the east wing with the joiners, but removed towards the southern end of it when at work during the day.

The tailors on the first-floor were exposed the whole day to the emanations from the northern cess-pool in privy No. 36, and a part of them to those from the eastern cess-pool in privy No. 42, as well as the shoemakers in their workroom and the joiners in their dormitory, without being attacked by acute disease in anything like the same degree.

The case of the spectacle-makers, who had their workroom and dormitories on the third-floor is highly interesting. That part of them, which was in dormitory No. 91 and numbered 32 persons, was just as much tied to the spot, as the 19 joiners. By day all the spectacle-makers in workroom No. 87 were exposed to the emanations from the northern cess-pool in privy 85, and at night the 32 men went to the same privy only from their dormitory. Their sole change of place consisted therefore in wandering from the one to the other side of the privy in question. And how mildly this department was visited in comparison with the joiners! 32 had 1 case of death, whilst the 19 joiners had 9 deaths affecting mostly young robust subjects.

That division of spectacle-makers (56) which slept in room 94 which is separated only by an overseer's room from No. 91, but partially reaches to the eastern wing of the building, fared again much worse, they had 7 deaths, 4 times as many in proportion, as those in No. 91.

I will mention another remarkable circumstance. The spinners, knitters and glove-makers work together on the second floor in room No. 57, and do not use any privy there during the day, but a tub, which is placed in dormitory No. 56 for the washers. As the spinners, as I have already mentioned, were on the whole more mildly visited than the weavers, I hoped to find perhaps an explanation in the privy arrangements, for the weavers were exposed the whole day in their workroom No. 58 to the northern cess-pool through the medium of the privy No. 62; I should have liked to find also a reason for the immunity of the 13 spinners, who slept in the dormitory No. 97 which was so heavily visited in other respects. But even the most minute analysis led to no result. 14 of the 36 spinners slept in rooms,

which had only tubs (1 in No. 56, 1 in No. 80, 9 in No. 98 and 3 in No. 99), but they had altogether 3 cases of cholera, which all ended fatally and 3 cases of diarrhoea. The sick-rate is therefore a little below, the mortality considerably above the mean.

I could get hold of only one fact, which might perhaps be quoted as favoring the theory of infection by privies. The soldiers remained free from cholera. The privy for the guard is near the south wall in the court-yard at the entrance into the prison. But no great weight can be attached to this fact either. In the first place the mere coincidence of two facts, unless it recurs very regularly, does not furnish the slightest proof of their physical connexion and the dependence of the one upon the other, and then this privy was used also by overseers, who must be considered quite as infected with cholera, as the prisoners.

I have also to mention the following particulars for the benefit of those who may wish to institute further comparisons.

The relation of the privies connected with the northern and eastern cess-pool to the workrooms and dormitories is evident on looking at the plans of the house. The privies connected with the southern cess-pool, which do not directly communicate with any workroom or dormitory, but only through the intervention of a corridor, are used so far as I have not already mentioned, by the porter and his family on the ground-floor, then by the cooks and bakers, those on the first-floor by the secretaries and head-overseer, and by the lithographers, who work close by. The straw-workers, who work in No. 47, and sleep for the most part in No. 32, do not use this privy during the night, but the privy No. 42, which the shoemakers have also.

The southern privy in the second-floor No. 76 is used by the joiners and straw-workers by day and occasionally also by the house-chaplain and school-master

The southern privies on the third-floor are not used by prisoners either by day or by night, but only by the overseers, who have their rooms near them.

When the prisoners are once in the dormitory, it is not opened any more during the night, and only those prisoners therefore can visit a privy during the night, who are in dormitories communicating with a privy, as is seen in the plans. Tubs are erected in all the other dormitories.

DISINFECTION OF EXCREMENTS.

The question of disinfection of excrements is intimately connected with the privies and their arrangement, so that I believe it will be the most appropriate place to discuss it here also. I give partly communications of Dr. Berr and some officers and overseers, partly my own observations.

Dr. Berr has furnished the Ministers of Justice and of the Interior with the following report on this subject:

The disinfection of the privies has been effected for years by means of sulphate of iron (80 grammes per man per day, since August 1873 after the experience gained in the epidemic at Munich 120 grammes of sulphate of iron per head per day mixed with crude carbolic acid (10 grammes per head per day).

In this way 5300 kilogrammes of sulphate of iron and 260 kilogrammes of carbolic acid were employed in the period between July 1st and December 1st 1873.

Of course there was no reduction in these quantities either at the time of the house epidemic or after it, but on the contrary too much if anything was done in this direction.

„The contents of the cess-pools as well as the sides of the descending pipes were often tested with respect to their acid reaction, and always found strongly saturated.“

Moreover in consequence of news from Munich after midsummer the special precaution was taken, of making all newly arrived convicts use a weak solution of carbolic acid for washing the hair in their first bath. The same measure was also afterwards enforced during and after the epidemic on the discharge of any convict.

Supposing all that had been prescribed was punctually carried out, the cholera even when introduced into the prison ought not to have spread according to the view commonly entertained. Instead of this however there followed such an explosion here, as had never been heard of in times, when disinfection was not yet thought of. The supporters of the view, that disinfection of the excrements is a measure of the utmost importance to prevent the dissemination of cholera, are still very numerous. They can it is true allege all kinds of excuses why disinfection availed nothing in Laufen, but they can never get over one thing, viz, that making all due allowance for deficient execution the disinfection was after all far better and more thoroughly carried out than on any previous occasion, and that the result not only did not correspond to the expectations and exertions that were made, but the very contrary happened.

It is self-evident, that no scrupulous cleanliness could prevail in the besieged privies during the height of the epidemic, when half the prisoners were already suffering from cholera, choleraic and simple diarrhoea, but who could conclude from the circumstance, that almost all had the cholera at a certain time, that they had first got the disease from this source?

It may be also said, that there will have been times and privies, in which the acid reaction of the excrements was temporarily suppressed by an alkaline one. I believe so myself, for during my stay in the institution I have not always been unsuccessful in demonstrating carbonate of ammonia in the air of different privy-pipes by means of moistened turmeric paper.

As regards the carbolic acid, my own observations tend to confirm those made also by Dr. Klinger, that there was not much smell of it in the large privies. Nor was it ascertained by analysis, how much pure hydrate of phenyl the crude carbolic acid contained. So much can hardly have been employed, that the disinfected matters contained 1 per cent of actual carbolic acid.

Moreover I have seen in the books of the institution, that 3195 kilo, i. e. 64 cwt of sulphate of iron were actually consumed in 168 days from July 1st to December 15th, making nearly 20 kilogrammes per day and reckoning the average number of prisoners at 500, 40 grammes daily for 1 prisoner, and as this metallic salt is not an article of food, and cannot be applied to any other purpose in this quantity, even a very scrupulous believer in disinfection can come to no other conclusion, than that the sulphate of iron was really thrown down the privies. I convinced myself too personally, when the great northern cess-pool was emptied, that even its sediment had a thoroughly acid reaction.

I am willing moreover to concede in favour of the believers in disinfection, that perhaps the mode of disinfection adopted in Laufen, however well intended and conscientiously carried out in the establishment, may have failed notwithstanding to kill the cholera germ supposed to be in excrements, that corrosive sublimate would perhaps have had a better effect: but I cannot concede in their favour, that any other danger proceeded from these excrements of the prisoners, than that proceeding from them at other times when cholera does not prevail and caused by pollution of the air with matters not peculiar to cholera. An experiment was made with the, I will assume, improperly and therefore unsuccessfully disinfected contents of these cess-pools at Laufen, which weighs heavily in the balance.

The liquid contents of the cess-pools are, as already mentioned in the introduction, often pumped out during the month and spread upon the fields. When the epidemic had broken out, this was at first omitted through a very justifiable fear of endangering the public health. As however not only far more evacuations took place at this time, but also more disinfecting fluid was put down the privies, all the cess-pools soon became full to overflowing. The liquid contents of the northern cess-pool even found their way at this time into the cellar, into which they trickled down the walls and from the ceiling, so

that wooden tubs were placed under to catch the liquid. When it was proposed to empty the cess-pools, public opinion and general sanitary considerations hindered the carrying out of this intention. Nobody would undertake this dangerous operation, and no parish would let this dangerous dung be carted through its roads and put on its fields.

The sanitary board deliberated, whether at least the liquid portion of the contents of the cess-pool might not be thrown into the rapidly flowing Salzach, as it was already disinfected; as however the mischief might have originated in the disinfected cess-pools, this would not do, especially as the Salzach on leaving the institution flows round the whole town of Laufen, and according to the views of most people the wells of Laufen are fed essentially by Salzach water filtering through the soil: it was to be feared, all the wells in the town would be poisoned.

And yet it was impossible to let the institution be any longer flooded with its own filthy mire. As necessity knows no law, means and ways were also found to empty the terrible cess-pools. The prohibition to carry it away was withdrawn, places fixed upon, where the liquid matters and dirt might be taken, and at last three intrepid farmers were found in the neighbourhood, who agreed to risk their lives for good money and good manure, and empty the cess-pools in the institution (the northern, southern and eastern in the main building, that of the cell-prison, that of the hospital and that of the director's house) in the nights of Dec. 17th and 18th, on each occasion between 12 p. m. and 6 a. m., and remove the contents out of the institution and out of the town. Seventy-five carts each drawn by 2 oxen were necessary for the purpose. Reckoning a cart at 20 cwts, the whole amount was 1500 cwts. The operation of emptying the cess-pools and filling the pails was performed by 8 prisoners, who volunteered for the work, and 4 men from the town (the sexton Fuchs and 3 assistants). Treiber the overseer superintended the whole business. Six drivers were also occupied in the transport, being sent by the three farmers who undertook the job. I was not an eye-witness it is true, but it seemed afterwards, as if the tubs and boxes had not all been hermetically sealed.

It remains to be stated, that not one of these 19 individuals who had come in the closest contact with the contents of the cess-pools was attacked with cholera, choleraic or simple diarrhoea, nor did any dissemination of cholera result in the neighbourhood of Laufen, or near the place of unloading. Nor did any harm happen to those who had undertaken the work.

I have already mentioned the disinfection of the infected linen and bodies, the burning of beds, bedsteads and blankets of those who had died of cholera in speaking of the measures adopted in the care and treatment of the patients, and have nothing further to add.

DIETARY.

The sudden appearance of cholera in the prison at Laufen, the very unusual dimensions and violence, which it assumed, and in addition its short duration, as if it had broken out in an ordinary small house inhabited by a few people, where it usually runs its course within a fortnight, will make an impression on every body that the prisoners had all received some poison pretty simultaneously, which affected them more or less according to their individual disposition and other allied influences, or that some pernicious circumstance had simultaneously but transiently affected them all uniformly. In such cases we generally think first of food and drink, and suppose the people must have eaten or drunk something poisonous. The attacks could scarcely indeed have occurred more suddenly and vehemently, if all the prisoners had eaten poisonous fungi at some meal.

The impression is still further strengthened by the circumstance, that only the prisoners and overseers, whose food is cooked in the establishment were attacked, but not the officials and soldiers, who had meals outside the institution. It is also to be remarked, that the unmarried overseers were more frequently and severely attacked than the married ones.

The great difference however in susceptibility observed among the different departments, although their dietary was perfectly uniform, militates against the view of their food having had any influence. The tailors have exactly the same food as the joiners. What however renders this theory absolutely impossible, is the remarkable immunity of the prisoners in solitary confinement, who partook of the very same food prepared in the same kitchen, in the same vessels and by the same cooks, as the prisoners in ordinary confinement, ate therefore out of the same dish as it were with them, but only began to be attacked with cholera and diarrhoea, when they were removed out of the cell-prison into the common prison, and even then only in a milder form and later than those confined in the common prison.

I shall give here (p. 75, 76) the dietary in the institution for prisoners and overseers, which is the same as that prescribed in all Bavarian prisons. I will not say, that it might not be improved, or should be improved, but I believe it may be acquitted of having caused the cholera in this institution.

I have inquired also about the sources from which the provisions were derived, and have learned nothing calculated to awaken the slightest suspicion of anything having reached the institution, that was not likewise employed in every other house at Laufen.

STORES AND RAW PRODUCTS INTRODUCED INTO THE ESTABLISHMENT.

I have also made inquiry about everything else in the shape of stores, raw products and other neccessaries, that were sent to the institution after Oct. 1873, whether perhaps there might be something among them, with which the cholera or the cholera germ could have been introduced; but this investigation also threw no light on the matter. I communicate the list of these also (p. 77, 78) in case some other person should be able to find out something among them.

DRINKING-WATHER.

Drinking-water still plays as is well known a very prominent part in the present etiology of cholera, and nothing would be more in harmony with the popular taste, than to assume this colossal outbreak of cholera in the prison at Laufen in the winter of 1873 had the same cause, as the explosion of cholera in Golden Square, London, in the summer of 1854, viz the pump in Broad Street, — this view would easily find favour with most people.

The case of Golden Square has made so great an impression in England, that it is already considered justifiable to regard the whole cholera question, at least so far as epidemics are concerned, as a mere question of drinking-water.

I endeavoured to show only a short time ago, on what a feeble basis this very proof of the influence of drinking-water rests, supposed to be derived from the outbreak in Golden Square*), and it is

*) See Zeitschrift der Biologie Vol. X p. 439: Is drinking-water the source of epidemic typhus?

therefore very gratifying to me to be able to test the influence of the drinking-water in the epidemic in the prison at Laufen more exactly, than would have been possible in an epidemic affecting a whole urban district and a population living in freedom.

The institution has two wells, which I have already mentioned in describing the institution in the introduction. The one is situated in the garden outside the southern boundary wall of the establishment, and is employed only to water the garden. The other is situated in the hospital court-yard (see ground-plan). It is the well, which properly speaking supplies the institution with water. All the drinking-water

DIETARY IN THE ROYAL PENAL PRISON AT LAUFEN.

WEEK-DAY	TIME OF DAY	FOOD	INGREDIENTS	WEEK-DAY	TIME OF DAY	FOOD	INGREDIENTS
Monday	Morning	Burnt-meal Soup	per head: burnt-meal 1 oz, suet 1 oz, salt vinegar and seasoning as required,	Thursday	Noon	Groat Soup with meat	per head: groats 3 oz, beef 4 oz;—for 100 men: salt 3 lbs, spices 3 oz, greens 8 oz.
"	Noon	Pease with Kraut	per head: pease 5 oz, sauerkraut $\frac{1}{4}$ lb, suet $\frac{1}{2}$ oz, burnt-meal 3 oz; — for 100 men: salt 3 lbs, spice.	"	Evening	Wheat meal Soup	per head: flour 3 oz, suet $\frac{1}{4}$ oz; — for 100 men: salt 3 lbs, spice 3 oz.
"	Evening	Groat Soup	per head: groats 3 oz, suet $\frac{1}{4}$ oz; — for 100 men: salt 3 lbs, spice 3 oz, greens 3 oz.	Friday	Morning	{Burnt-meal Soup}	as on Monday.
Tuesday	Morning	{Burnt-meal Soup}	as on Monday.	"	Noon	Dumpling	per head: flour 4 oz, white bread 5 oz, suet $\frac{1}{2}$ oz; — for 100 men: salt 3 lbs, spice 3 oz, greens 8 oz.
"	Noon	Rumford Soup	for 100 men: pearl-barley 11 lbs, pease 11 lbs, potatoes 50 lbs, pork $3\frac{1}{2}$ lbs, salt 2 lbs, vinegar 2 quarts, white bread $12\frac{1}{2}$ lbs, pepper 1 oz, majoram 2 oz.	"	Evening	Potato Soup	per head: potatoes 1 lb, suet $\frac{1}{4}$ oz, burnt-meal $\frac{1}{4}$ oz; — for 100 men: salt 3 lbs, spice 3 oz.
"	Evening	Potato Soup	for 100 men: potatoes 100 lbs, burnt-meal 1 lb 9 oz, suet 1 lb 9 oz, salt 3 lbs, spice 1 oz.	Saturday	Morning	{Burnt-meal Soup}	as on Monday.
Wednesday	Morning	{Burnt-meal Soup}	as on Monday.	"	Noon	Rumford Soup	for 100 men: pearl-barley 11 lbs, pease 11 lbs, potatoes 50 lbs, pork $3\frac{1}{2}$ lbs, salt 2 lbs, vinegar 2 quarts, white bread $12\frac{1}{2}$ lbs, pepper 1 oz, majoram 2 oz.
"	Noon	Potato Soup	per head: potatoes 2 lbs, suet $\frac{1}{2}$ oz, burnt-meal $\frac{1}{2}$ oz; — for 100 men: salt 3 lbs, spice 3 oz.	"	Evening	Bread Soup	per head: rye-bread 4 oz, suet $\frac{1}{4}$ oz; — for 100 men: salt 3 lbs, spice 3 oz.
"	Evening	Rice Soup	per head: rice 2 oz, suet $\frac{1}{4}$ oz; — for 100 men: salt 3 lbs, spice 3 oz, greens 8 oz.	Sunday	Morning	{Burnt-meal Soup}	as on Monday.
Thursday	Morning	{Burnt-meal Soup}	as an Monday.	"	Noon	Rice Soup with meat	per head: rice 3 oz, beef 4 oz; — for 100 men: salt 3 lbs, spice 3 oz, greens 8 oz.
				"	Evening	Burnt-meal Soup	per head: burnt-meal 3 oz, suet $\frac{1}{4}$ oz; — for 100 men: salt 3 lbs, vinegar $2\frac{3}{4}$ quarts, spice 3 oz.

for the prisoners is pumped out of this well, the wash-house and bath-house are likewise supplied from it, and most of the water used for cleaning is taken from here. The establishment has also running water, conducted from the opposite bank of the Salzach, from Oberndorf, but this to my knowledge flows only into the kitchen, and is employed for cooking and washing up. The water from the pump in the hospital court is preferred by all for drinking purposes to the water laid on, because it always tastes fresh and good and has the same temperature in summer and winter. After violent and continuous rain it exhibits here and there a little turbidity, but no material change in taste.

The soldiers on duty at the guard-house were probably not forbidden to fetch their drinking-water from the running water in the kitchen, but they never did so, procuring it invariably from the pump in the hospital court-yard.

With respect now to the chemical composition of these two waters, they are similar as regards solid residue and amount of chlorine, at all events not nearly so different, as might have been supposed from their different origin, the one from a bubbling spring on the heights on the opposite bank of the Salzach, the other from a well excavated so to say in the midst of the institution and surrounded by different cess-pools.

Both are calcareous hard waters, such as are found everywhere throughout the whole Bavarian table-land and also in the mountains, as far as the chalk formation reaches; it seemed sufficient for the purpose of comparison, to examine their appearance and taste, solid residue and amount of chlorine, especially as the latter substance generally indicates, how far the vicinity of refuse matters from the human household exercises an influence. Both waters were clear and colourless and of a good taste. That from Oberndorf tastes a little of the wooden tubes, through which it is conducted.

[continuation of the text at p. 79.]

DIETARY OF SICK PRISONERS.

The dietary is divided into $\frac{1}{4}$ diet, $\frac{1}{2}$ diet and $\frac{3}{4}$ diet.

- 1) The diet consists of three plain or meal soups to a quart, or a glass of milk and 2—3 plain or meal soups. The soups must be well prepared with herbs and well salted.
- 2) $\frac{1}{4}$ diet consists: in the morning of burnt-meal soup, made of meal 1 oz, suet $\frac{1}{6}$ oz, salt $\frac{1}{4}$ os, at noon of meal-soup made of groats, rice, white bread, 1—2 boiled eggs or cooked fruit (plums 2—3 oz); in the evening of meat soup made of groats, millet etc., bread $1\frac{1}{2}$ —3 oz according to order. — If the patient receives 3 oz of bread, 3 oz are given at noon and 3 in the evening.
- 3) $\frac{1}{2}$ diet consist: in the morning of burnt-meal soup, at noon of thick soup, 12 oz of beef or roast veal or mutton and vegetables. The quantity of meat is dependent on the order; in the evening of soup, jam when it is ordered, 6 oz of rye-bread or 3 oz of white bread, if it is specially ordered.
- 4) $\frac{3}{4}$ diet consists: in the morning of burnt-meal soup; in the evening thick soup, 3—4 oz of beef, vegetables, in the evening thick soup, 2—3 oz of beef, veal, mutton, 6 oz of rye-bread, which in urgent cases may be increased to 8 oz when ordered.

DIETARY FOR THE OVERSEERS.

Morning.

Burnt-meal soup daily, in addition 1 oz of meal, $\frac{1}{4}$ oz suet, $\frac{1}{4}$ lb of white bread per man.

Noon.

Barley, groats, rice etc. alternately 2 oz per head, pease 4 oz, bread 3 oz for soups etc.; then 1 lb of vegetables, $\frac{1}{4}$ oz of suet, 7 oz of beef (on Sundays instead of beef 7 oz of veal) and $\frac{1}{2}$ quart of beer per head.

Evening.

Barley-, groat-, rice-, burnt-meal soup 2 oz; then 7 oz of beef, 1 lb of vegetables, in addition $\frac{1}{4}$ oz of suet, then as at noon $\frac{1}{2}$ quart of beer per head. 1 lb of bread (rye-bread) allowed daily to each person.

LIST

of raw products ordered by the managers of the prison at Laufen from Oct. 1st to Nov. 30th 1873.

DATE			ARTICLES	NAME OF VENDOR	WHENCE OBTAINED
Day	Month	Year			
1	Oct.	1873	17 trousers, waistcoats, coats	Anton Stangl, clothier	Laufen
1	"	"	1 sofa frame, 6 stools, 3 crosses, 1 box, 6 bedsteads	Karl Reischl, joiner	Laufen
1	"	"	10 kilo. of tow-yarn	E. Stockhamer, wife of carpenter	Obslaufen near Laufen
3	"	"	11½ kilo. of yarn	Rochus Diezinger, messenger	Reichenhall
4	"	"	11 trousers, waistcoats, coats	Anton Stangl, clothier	Laufen
4	"	"	19½ kilo. of yarn	Th. Lepperdinger, farmer	Buchach, district of Oberndorf
4	"	"	5½ kilo. of flax	Theres Kapeller, farmer's wife	Mayerhofen near Laufen, road from Laufen to Freylassing
5	"	"	19 kilo. 200 gm. of calf-skin, 41 kilo. 500 gm. of shoe-leather, 41 kilo. of welt-leather, 4 kilo. of sheep's-leather	Antou Messner, currier	Laufen
6	"	"	500 kilo. of raw hemp	Martin Schellmoser, rope-maker	Laufen
6	"	"	36 common deals, 19 cherry-tree planks, 7 beech planks	Johann Wimmer, carpenter	Friedorffing, road to Tittmoning
6	"	"	1505 kilo. of straw	Joseph Barth, brewer	Laufen
6	"	"	380 kilo. 500 gm. of iron, 133 kilo. 500 gm. of sheet-iron	August Edelmann, ironmonger	Laufen
6	"	"	11 trousers, waistcoats, coats	Anton Stangl, clothier	Laufen
6	"	"	3 pairs of women's boots	Ign. Eisgruber, shoemaker	Oberndorf (Austrian Laufen)
6	"	"	5½ kilo. of hemp-yarn	Elisabeth Kroiss, farmer's wife	Gauschburg (district of Oberndorf)
8	"	"	101 kilo. of iron	August Edelmann, ironmonger	Laufen
8	"	"	7 kilo. of hemp-yarn	Jos. Niederhauser, baker	Oberndorf (Austrian Laufen)
9	"	"	50 kilo. of rye-meal	Joseph Schneider, baker	Laufen
9	"	"	1.5 kilo. of brass	August Edelmann, ironmonger	Laufen
10	"	"	10 kilo. of lard	Leonhard Lechner, butcher	Laufen
11	"	"	68 kilo. of iron	August Edelmann, ironmonger	Laufen
11	"	"	5 lbs of nails	"	Laufen
11	"	"	16 trousers, waistcoats, coats	Anton Stangl, clothier	Laufen
11	"	"	22½ kilo. of yarn	Mar. Niederstrasser, farmer's wife	Oed, parish of Steinbrüning near the Freilassing road
11	"	"	17½ kilo. of hemp-yarn	Simon Lang, farmer	Petting near lake Waging
11	"	"	31½ kilo. of tow-yarn	Franz Stadler, innkeeper	Laufen
13	"	"	10 quires of coloured paper	Max Laumer, bookbinder	Laufen
13	"	"	5 pairs of shoes	Ign. Eisgruber, shoemaker	Oberndorf (Austrian Laufen)
15	"	"	4 kilo. of hemp	Martin Schellmoser, rope-maker	Laufen
15	"	"	22 trousers, waistcoats, coats	Anton Stangl, clothier	Laufen
17	"	"	10 kilo. linseed oil	Franz Xaver Gasteger, tradesman	Laufen
17	"	"	2 kilo. of copal varnish	Franz Straussenger, painter	Laufen
18	"	"	54 metres of fustian	Franz Xaver Gasteger, tradesman	Laufen
18	"	"	5 doz. pegs	Max Laumer, bookbinder	Laufen
18	"	"	18½ kilo. of tow-yarn	K. Schmidlechner, farmer's wife	Reit, near Skt. Pantaleon (Austria)
20	"	"	12 metres of fustian	Franz Xaver Gasteger, tradesman	Laufen
20	"	"	5 quires of white paper	Max Laumer, bookbinder	Laufen
20	"	"	20 trousers, waistcoats, coats	Anton Stangl, clothier	Laufen
20	"	"	3 pairs of shoes	Ign. Eisgruber, shoemaker	Oberndorf (Austrian Laufen)
21	"	"	16 kilo. of ox-leather	Anton Messner, currier	Laufen
21	"	"	5 packets of nails	August Edelmann, ironmonger	Laufen
22	"	"	10 metres of beaver	Franz Xaver Gasteger, tradesman	Laufen
22	"	"	15 kilo. of tin	August Edelmann, ironmonger	Laufen
22	"	"	4½ kilo. of flax-yarn	Maria Gjerlinger, farmer's wife	Oberhaining near lake Absdorf
22	"	"	12½ kilo. of yarn	Theres Jell, farmer's wife	Harpfetsham, Löwenau (Tittmoning road)
23	"	"	15 kilo. 700 gm. of calf-skin, 40 kilo. of shoe-leather, 35 kilo. of welt-leather	Anton Messner, currier	Laufen
25	"	"	51 pairs of shoes	Pet. Eisgruber, shoemaker	Uebersee (Chiemsee)
27	"	"	210 kilo. 500 gm. of iron	August Edelmann, ironmonger	Laufen
27	"	"	10 kilo. of olive oil, 10 kilo. of linseed oil	Fraz X. Gasteger, tradesman	Laufen
27	"	"	500 gm. of cinnabar	Franz Straussenger, painter	Laufen
27	"	"	7 kilo. copal varnish, 10 litres of vinegar, 2 kilo. of gum-arabic, 1 kilo. of nitric acid	Franz X. Gasteger, tradesman	Laufen
27	"	"	22 trousers, waistcoats and coats	Anton Stangl, clothier	Laufen
27	"	"	4 pair of shoes	Ign. Eisgruber, shoemaker	Oberndorf (Austrian Laufen)
27	"	"	9 kilo. of yarn	Anna Strasser, farmer's wife	Mayerhofen near Laufen, road to Frey- lassing

(Continuation).

LIST

of raw products ordered by the managers of the prison at Laufen from Oct. 1st to Nov. 30th 1873.

DATE			ARTICLES	NAME OF VENDOR	WHENCE DERIVED
Day	Month	Year			
27	Oct.	1873	12½ kilo. of yarn	Elisab. Schmelzi, farmer's wife	Haarmos nr. Leobendorf (lake Abtsdorf)
27	"	"	19 kilo. of hemp-yarn	Franz Wasinger, farmer	Salzburghofen
27	"	"	8½ kilo. of hemp-yarn	A. M. Buchstetter, farmer's wife	Obereching (Austria)
29	"	"	12 kilo. of oakum, 1 girth	Martin Schellmoser, rope-maker	Laufen
29	"	"	12 kilo. of tow-yarn	Georg Arnstorfer, farmer	Aglassing near Oberndorf
29	"	"	20½ kilo. of yarn	Theres Maier, farmer's wife	Au (Löwenau)
29	"	"	24 kilo. of yarn	Josephs Esterer, farmer	Ringham (Salzburg-Wasserburg road)
30	"	"	30 kilo. of iron	August Edelmann, ironmonger	Laufen
31	"	"	5 kilo. of yarn	Elisabeth Barbinger, farmer's wife	Gömming, district of Oberndorf
3	Nov.	"	27 kilo. 500 gm. of ox-leather	Anton Messner, currier	Laufen
3	"	"	75 kilo. of iron	August Edelmann, ironmonger	Laufen
3	"	"	41 trousers, waistcoats, coats	Anton Stangl, clothier	Laufen
3	"	"	5 pairs of shoes	Ign. Eisgruber, shoemaker	Oberndorf (Austrian Laufen)
4	"	"	3 pieces of different woods, 64 boards for bookbinding, 88 common boards, 10 cherry-tree planks, 3 beech planks, 5 bolts	Johann Wimmer, carpenter	Friedorfing (Tittmoning road)
4	"	"	17½ kilo. of yarn	Sailors' Hospital	Oberndorf (Austrian Laufen)
5	"	"	41 sq. metres of veneer	Daniel Glück	München
5	"	"	10 kilo. of wire	August Edelmann, ironmonger	Laufen
5	"	"	50 pairs of slippers	Jos. Alibrandi, shoemaker	Tittmaring
5	"	"	112 metres of towels	Franz Xaver Gasteger, tradesman	Laufen
6	"	"	18 kilo. of tow-yarn	Simon Lang, farmer	Petting near lake Waging
7	"	"	4990 kilo. of straw	Joseph Barth, brewer	Laufen
8	"	"	50 kilo. of rye-meal	Joseph Schneider, baker	Laufen
8	"	"	12½ kilo. of hemp	J. A. Huber, rope-maker	Rosenheim
8	"	"	50 trousers	Johann Klepper, clothier	Rosenheim
8	"	"	5 pairs of shoes	Ign. Eisgruber, shoemaker	Oberndorf (Austrian Laufen)
10	"	"	7 kilo. of sheep's leather	Anton Messner, currier	Laufen
10	"	"	81 kilo. 500 gm. of iron, 7 kilo. 500 gm. of steel	August Edelmann, ironmonger	Laufen
10	"	"	12 kilo. of hemp, 3 kilo. of hemp	Martin Schellmoser, rope-maker	Laufen
10	"	"	3 kilo. of tow-yarn	Jakob Mühlthaler, farmer	Osing near Laufen on the Salzach
10	"	"	9 kilo. of tow-yarn	Rosam. Rehl, farmer's wife	Kulbing near Leobendorf (lake Abtsdorf)
10	"	"	2½ kilo. of flax	Theres Kappeller, farmer's wife	Mayerhofen near Laufen, Freylassing road
11	"	"	15 kilo. of starch	Franz Xaver Gasteger, tradesman	Laufen
11	"	"	25 kilo. of glue, 10 litres of spirit	"	Laufen
12	"	"	6 kilo. of woollen yarn	Sailors' Hospital	Oberndorf (Austrian Laufen)
15	"	"	56 trousers, waistcoats, coats	Anton Stangl, clothier	Laufen
15	"	"	17½ kilo. of hemp-yarn	Urban Teininger, farmer	Schönram (Salzburg & Wasserburg road)
15	"	"	44½ kilo. of yarn	Elisabeth Jaeger, farmer's wife	Berg, parish of Laufen
17	"	"	1 box of plate-glass	Sebastian Angerer, tradesman	Laufen
17	"	"	6 kilo. of oakum, 4 kilo. of hemp	Martin Schellmoser, rope-maker	Laufen
17	"	"	50 kilo. of hemp	J. A. Huber, rope-maker	Rosenheim
17	"	"	1½ kilo. of woollen yarn	Elise Stein, farmer's wife	Oberhaining, parish of Laufen (lake Abtsdorf)
17	"	"	25 kilo. of tow-yarn	Simon Lang, farmer	Petting (lake Waging)
19	"	"	16 kilo. 350 gm. of calf-skin, 44 kilo. 500 gm. of sole-leather, 42 kilo. 200 gm. of welt-leather	Anton Messner currier	Laufen
19	"	"	4 pairs of shoes	Ign. Eisgruber, shoemaker	Oberndorf (Austrian Laufen)
19	"	"	3 kilo. of woollen yarn	A. Tiefenbacher, cooper's wife	Villern near Laufen, Freylassing road
19	"	"	9½ kilo. of tow-yarn, 6 kilo. of flax-yarn	Manka Schlosser, farmer's wife	Obereching (Austrian)
20	"	"	25 trousers, waistcoats, coats	Anton Stangl, clothier	Laufen
21	"	"	11½ kilo. of hemp-yarn	Walburg Maier, farmer's wife	Surheim (Freylassing road)
22	"	"	162 kilo. of raw hemp	Alois Sauseng, rope-maker	Oberndorf (Austrian Laufen)
22	"	"	12 kilo. of oakum	Martin Schellmoser, rope-maker	Laufen
24	"	"	6 kilo. of hemp	"	Laufen
24	"	"	9 kilo. of tow-yarn	Kasper Hauthaler, cottager	Strass, parish of Laufen
25	"	"	172 kilo. 500 gm. of iron	August Edelmann, ironmonger	Laufen
26	"	"	1250 kilo. of straw	M. Koellerer, farmer's wife	Laufen
26	"	"	10 kilo. of wire	August Edelmann, ironmonger	Laufen
26	"	"	4½ kilo. of flax-yarn	Alois Hoermann, carpenter	Laufen
27	"	"	12½ kilo. of hemp-yarn	Simon Schlacht, tradesman	Törring, parish of Tittmoning
29	"	"	53 trousers, waistcoats, coats	Anton Stangl, clothier	Laufen
29	"	"	18 kilo. of oakum	Martin Schellmoser, rope-maker	Laufen
29	"	"	12 kilo. tow-yarn	Helena Hainz, farmer's wife	Niederhaining, parish of Laufen, Freylassing road

The water conducted from Oberndorf yielded 350 milligrammes of white residue and 1.6 of chlorine per litre. The water from the well in the hospital court-yard yielded as the mean of 4 analyses made at different times 300 milligrammes and 7.5 milligrammes of chlorine per litre.

The total residue is less in the case of the well in the prison, than in that of the Oberndorf spring, on the other hand the former contains 5 times as much chlorine. Reichardt gives 8 milligrammes per litre as the maximum limit of chlorine in his „Principles of the analysis of drinking-water“. It is clear, that the well in the establishment almost reaches this limit. In order to convince myself, that this somewhat high amount of chlorine was not at all a natural feature in the ground-water of the left bank of the Salzach, but the result of its draining through a soil rendered impure by human habitation, I procured specimens from two other wells, one outside and above the town of Laufen (Neuhauser Hof, between the Teisendorf and Tittmoning roads), the other from the lower part of the town (Bruck-Brewery quite near the Salzach). The water from Neuhauser Hof yielded 300 milligrammes of solid residue and 5.6 milligrammes of chlorine, that from the Bruck brewery only 255 milligrammes of residue, but 8.6 milligrammes of chlorine.

The increase in the amount of chlorine in the ground-water, as we pass from the periphery to the centre of the town, seems to me to be an indisputable proof of the influence of human habitations upon the ground-water.

The quality of the water does not remain unalterably the same in any well or spring, but varies at certain times. The water in the prison-well was not examined before and during the epidemic, but it is certain, that no unusual or special change was remarked in it.

Samples were taken from the prison-well:

1)	on Feb.	25th	1874	at	8 a. m.
2)	„	„	28th	„	8 „
3)	„	„	28th	„	12 „
4)	„	March 1st	„	„	8 p. m.
Sample 1 yielded 310 milligrammes of residue per litre.					
„	2	„	325	„	„ „ „ „
„	3	„	285	„	„ „ „ „
„	4	„	280	„	„ „ „ „

It follows therefore from these analyses, that the amount of residue is largest in the morning hours, declines towards evening and increases again during the night. This circumstance is very simply explained by the different quantities of water removed at different periods of the day. In proportion as the level of the water in the well and in its immediate neighbourhood sinks in consequence of pumping, the supplies from different sides naturally vary. That the level of this much used well is generally lower than that of the surrounding ground-water, is very distinctly evident in the measurement, which Herr Heilmaier made at the same time in the prison garden and in the well in the hospital courtyard on Dec. 4th 1873 (see ground-plan I). The level of the well in the garden was 0.287 metres higher on the same plane than that in the hospital court.

There exists therefore at all times a possibility of matters which pass into the ground-water from the surface getting also into this well from different parts of the subsoil. It must be admitted beforehand that such a pollution of the ground-water of the establishment is possible, and that the opportunities are many. There is not any necessity to call to mind the large cess-pools, which however well cemented, are yet not absolutely water-tight, as had been unmistakably proved in the case of the northern cess-pools (it is true only on the occasion of its being overfilled) by its contents penetrating into the cellar, there are other opportunities still nearer at hand. Not only is water pumped in the hospital courtyard, but there is also much cleaning and scrubbing, even privy-tubs are washed there, and very much dirty water is poured

into the sinks and drains there throughout the whole year. It would be surprising, if nothing at all passing from the surface reached the ground-water supplying the well through this soil. How far however the organic substances are changed on their way through a layer 14 metres thick one-third filled with air, is evident from the fact, that the carbon and nitrogen of most of the organic substances here to be considered, reach the ground-water below completely oxidised in the form of the last products of combustion, viz, as carbonic and nitric acid. Whether and under what circumstances the cholera germ is able of itself alone to resist changes, to which the excrements in which it is said to be contained are regularly subject, is unknown to anybody, and whether the germ of the great epidemic of cholera in the prison at Laufen reached the drinking-water in this way, and was thus essentially distributed and communicated, is a question which we must not attempt to decide by mere conjectures but which must be still further tested in the field of facts.

The members of the Cholera Commission of the German Empire were certainly right therefore on the occasion of their presence in Laufen in drawing attention to the circumstance, how easily a pollution of the drinking-water was possible from the hospital court-yard, and ordering the soil under the sink and drain to be dug up, in order to ascertain, how far traces of moisture, pollution by organic matters etc. might be more perceptible here than in other places. After the result of the excavations had proved negative, I did not yet feel quite satisfied. In order to perceive marked differences in the impregnation of a soil with organic matters or in their passage through it, on merely digging it up, the differences must already be very considerable and evident, for with a very porous filter it is never seen, whether much or only a little has filtered through. I preferred therefore to make at once a quantitative experiment on the connexion between surface and well-water, and threw salt into the sink, which would gradually be dissolved in the water passing through, and if there was a possibility of its getting partly also into the water of the well, would increase the amount of chlorine in it. The salt, which Professor Goppelsröder used on the occasion of the epidemic of typhus in Lausen in order to determine the connexion between a brook and a spring, offers two great advantages: first it is not in the least decomposed in going through different strata, and then it is very easy to determine its exact quantity in water.

On Feb. 25th 1874 at 8 a. m. a sample of water was taken from the hospital well, then $\frac{1}{4}$ cwt of rock-salt thrown into sink a. After this samples were taken at intervals of 2 hours until 8 p. m. and 1 litre of each sent to me to Munich for examination. Samples were likewise taken on Febr. 26th and 27th, so that 21 samples were collected in these 3 days.

On Feb. 28th at 8 a. m. the same quantity of rock-salt was thrown into sink b, and the observations likewise continued for 3 days, 21 samples being again obtained.

These 42 specimens of water were examined comparatively for their amount of chlorine, and no difference was observed.

It might be supposed the solution of salt had time enough in 6 days to penetrate an extremely porous stratum of 14 metres, and in case it should require a still longer time, a possibility, which I am not prepared to deny, certainly very much time and opportunity are offered for the well-known appearances attending the decomposition of organic substances in the soil. A fluid, which has to sink through a stratum of earth 14 metres thick within 6 days, must traverse not quite 2 millimetres (1.62) in a minute.

It is not difficult however to prove by other actual circumstances, that the prisoners could not have been infected by the drinking-water in the hospital court-yard.

The drinking-water was the same in the whole establishment; the eastern half had no other than the western, the tailors and spectacle-makers no other than the shoemakers, brushmakers and joiners, and yet what great differences in individual departements and localities!

The orthodox believer in the drinking-water theory will still perhaps endeavour under these circumstances to save the possibility of his belief, and bring forward all kinds of collateral influences,

individual disposition etc. by way of explanation, but a single fact makes all such endeavours appear hopeless in this case from the first, viz, this, that the soldiers remained free from the epidemic, although they, as long as they were in the guard-room at the prison, had no other water to drink, than that from the well in the hospital court-yard.

The guard-room, as mentioned above, was not evacuated by the soldiers until the evening of Dec. 6th, till then it had been regularly occupied every day by 12 men, 1 non-commissioned officer and 1 lance-corporal. If it is then assumed, that the drinking-water introduced cholera-germs about Dec. 1st, every soldier in the detachment consisting of 67 men had been already exposed to the influence of this water in the course of 6 days.

It may be still urged, the soldiers do not drink so much water as the prisoners, the soldiers drink beer at the guard-house as in the tavern. There are numerous exceptions however to this rule, and the pay of most soldiers, and the other money which they may chance to have, is insufficient to enable them to quench their thirst solely with beer throughout the 24 hours. Those too, who perhaps drank only beer, who however certainly did not constitute the majority, at least rinsed out the beer-mugs with the prison water, and this would certainly have been just as dangerous in the case of cholera, as in that of typhus, which according to the view of the drinking-water theorists a milkman in Islington is said to have disseminated among all his customers solely through having washed out his milk-cans with water from a reservoir, into which the rats had made a passage from a drain in working their way through the yard into the house.

On making more minute enquiry I was most distinctly informed, that the soldiers, although they would have preferred to drink only beer, yet drank water at the guard-house, although comparatively less than the prisoners. Should now perhaps a further rejoinder be made, that it was even then still possible, that a cholera germ had never been in the draught of water which the soldiers certainly took here and there, and that this invisible kind of fishing in drinking-water had concentrated itself chiefly in the mugs of the prisoners, I should still think such an explanation much more improbable than the whole drinking-water theory.

A still more conclusive proof moreover, that the outbreak of cholera in Laufen had nothing to do with the drinking-water, is to be found in my opinion in the exemption of those prisoners, who had been in solitary confinement up to the morning of Dec. 4th. They drank every day the same water as the prisoners in the common prison. As long as they drank this water in their cells, they had no cholera, only when they left their cells and were distributed among the others in the common prison, did some cases of cholera and diarrhoea occur among them also. As I have already shown before, it is clear from the chronological succession of cases of diarrhoea in this group, that the origin of the disease was undoubtedly of later date, than among the other prisoners in the common prison.

I cannot therefore regard the drinking-water any more than the food as a common source of infection for the prisoners. If the sudden and frequent seizure of so many must notwithstanding be attributed to something, which at the same time must have been just as much within the reach of all as food and drink, and which besides might contain more noxious matter in one part of the house than in another at certain times, there remains nothing but the air, which could contain more or less of one and the same noxious principle inherent in the locality in different rooms. The use of air is generally undervalued: foods and drinks are readily comprehended in a material form, but the air is not seen, nor felt, as long as it surrounds us uniformly and tranquilly on all sides, at most something is smelt here and there, and yet we cannot dispense with it a moment, and inhale 9000 litres of it on an average within 24 hours. Although therefore a prisoner drinks 3 litres of prison water in a day, he yet always consumes three thousand times more litres of prison air with various gaseous and dust-like admixtures according to the spot where he abides.

The quantity of air, which we consume in 24 hours, is not to be lightly estimated even in

point of weight, it amounts to about $11\frac{1}{2}$ kilo or 23 lbs daily. We do not consume such quantities of any other article of food.

I shall content myself for the present with merely hinting at the possibility of an explanation of the occurrence of the epidemic, without now going more minutely into the matter. I should like to attempt an explanation at the end of my report, after having first obtained the judgment of the commission.

INTRODUCTION OF CHOLERA FROM THE PRISON INTO OTHER PLACES BY MEANS OF DISCHARGED PRISONERS.

It seemed to me an important duty, not only to investigate, by what prisoners the cholera was conveyed from Munich to Laufen, but also from there again to other places. I received from the director a list of all the prisoners discharged between Nov. 1st and Dec. 16th 1873, on which day the cholera epidemic in Laufen terminated with the seizure of Frau Ensmann (see list p. 83, 84).

This list comprises 82 persons, who on leaving Laufen were dispersed over pretty well all southern Bavaria.

It might be considered superfluous, to take into consideration the prisoners discharged before the outbreak of the epidemic, i. e. from Nov. 1st to the 28th; I have included them however in the survey, in order if possible to fix the period, within which residence in the institution caused infection. According to prevalent views it might have happened, that prisoners, who had already been discharged some time before the outbreak of cholera at Laufen, when dispersed abroad in their homes, were variously attacked with cholera and choleroïd symptoms at the same time as those left behind in Laufen, and this might have furnished important contributions to our knowledge of the period of incubation.

The Bavarian Minister of the Interior, at my request, ordered this list to be printed, and the following circular was despatched by the provincial governors to all the district officers.

KINGDOM OF BAVARIA.

Ministry of the Interior.

In the annexed list in x copies those convicts are inscribed, who where discharged from the institution during the prevalence of the epidemic in the prison at Laufen on the days mentioned. In order to obtain perhaps some new insight into the mode of dissemination of this disease. investigations are to be made on the following heads.

- 1) where the persons discharged went to on leaving Laufen, where they stopped for the time being, and especially, where they slept;
- 2) where they may have left individual garments or other articles taken with them out of the prison;
- 3) whether they themselves were attacked with cholera or choleroïd symptoms after leaving the prison, and if so, when;
- 4) whether any one was attacked with such symptoms in their immediate neighbourhood, in houses in which they had slept or remained some time;
- 5) whether the persons thus attacked had come in direct contact with the prisoners discharged from Laufen.

All the administrative boards of the several government districts, having each received a copy of the annexed list, are hereby commissioned to make the necessary inquiries in order to answer as fully as possible the foregoing questions relative to those persons mentioned in the list, who belong to their respective districts, or of whom it can be ascertained, that they are residing in the district or about whom inquiries are received from other boards, and to hand in the result as soon possible to the Minister of the Interior.

Munich, the 23rd of December 1873.

von Pfeufer (Minister of State).

v. Du Bois (General Secretary).

[Continuation of text at p. 84.]

LIST

of persons who left the prison at Laufen from November 1st to December 16th.

No.	NAME	HOME		DATE OF DEPARTURE			REMARKS
		Place	Assize Town	Year	Month	Day	
1	Falter, Franz	Zeling	Mühldorf	1873	Nov.	1	
2	Schuh, Michl	Hundesrück	Grafenau	"	"	1	
3	Schwaiger, Josef	Tölz	—	"	"	1	
4	Wimmer, Kaspar	Pfarrkirchen	—	"	"	2	
5	Schwarz, Albin	Kaufbeuren	—	"	"	"	
6	Kratzer, Michl	Kiessing	Friedberg	"	"	3	
7	Goetz, Jacob	Burgau	Günzburg	"	"	"	
8	Leiss, Benedikt	Wolfrathshausen	München r. I.	"	"	"	
9	Kratzer, Johann	Wertingen	Donauwörth	"	"	"	
10	Wimbauer, Anton	Eggenfelden	—	"	"	"	
11	Freundl, Georg	Weilenbach	Schrobenhausen	"	"	5	
12	Zaunhuber, Mathias	Oberkassel	Altötting	"	"	"	
13	Koebl, Anton	Pföding	Ingolstadt	"	"	"	
14	Fröhlich, Michl	Amberg	Mindelheim	"	"	"	
15	Siebentritt, Albert	Regensburg	—	"	"	"	removed to Amberg
16	Brunner, Johann	Fürth	Cham	"	"	6	
17	Hins, Remigeus	Rosshaupten	Günzburg	"	"	"	
18	Siker, Gottlieb	Heilbach	Bogen	"	"	7	
19	Schmid, Franz	Kleinhöhenrain	Rosenheim	"	"	"	
20	Ottillinger, Sebastian	Oberzettelbach	Aichach	"	"	8	
21	Reiter, Josef	Höchstädt	Dillingen	"	"	"	removed to Rebdorf
22	Ostermaier Jakob	Untermenzing	München l. I.	"	"	"	
23	Maier, Simon	Burgwang	Rottenburg	"	"	9	
24	Schiessl, Michl	Buxheim	Aichach	"	"	10	
25	Rechl, Franz	Abracham	Mühldorf	"	"	11	
26	Rohrmaier, Thomas	Augsburg	—	"	"	12	
27	Schuster, Johann	Degenthumbach	Eschenbach	"	"	13	
28	Reitberger, Leonhard	Sulzemoos	Dachau	"	"	14	
29	Seider, Martin	Thurmansweng	Passau	"	"	16	
30	Schloegl, Josef	Gernzwei	Eggenfelden	"	"	17	
31	Schmidmaier, Albert	Tegernbach	Pfaffenhofen	"	"	18	
32	Altmann, Johann	Ruhmannsfelden	Vichtach	"	"	"	
33	Heilmaier, Andreas	Schrobenhausen	—	"	"	21	
34	Hechenberger, Leonhard	Heimhausen	Dachau	"	"	22	
35	Haertl, Franz	Regendorf	Stadtamhof	"	"	"	
36	Schober, Josef	Geisling	Regensburg	"	"	"	removed to the workhouse at Rebdorf
37	Poelsterl, Lorenz	Kühberg	Erding	"	"	"	
38	Ney, Josef	Gündelkofen	Landshut	"	"	23	as No. 36
39	Alberl, Philipp	Karlsberg	Frankenthal	"	"	"	
40	Moser, Matthias	Leoprechting	Passau	"	"	"	
41	Gietl, Josef	Cham	—	"	"	24	
42	Ellwanger, Franz	Gerzen	Vilsbiburg	"	"	"	
43	Tröber, Ludwig	Obereck	Mindelheim	"	"	25	
44	Pell, Matthias	Siegenburg	Kelheim	"	"	"	
45	Kindscofer, Jakob	Kelheimwinzern	"	"	"	"	
46	Reiter Josef	Ankofen	Pfaffenhofen	"	"	"	
47	Press, Benedikt	Hepperg	Ingolstadt	"	"	"	
48	Gröbmaier, Anton	München	—	"	"	26	
49	Baier, Max	Vohburg	Pfaffenhofen	"	"	"	
50	Maier, Josef	Immenstadt	Sonthofen	"	"	"	
51	Drax, Andreas	Fortseon	Ebersberg	"	"	27	
52	Hunseder, Georg	Kirchseon	"	"	"	"	
53	Beck, Sixtus	Fünfstetten	Donauwörth	"	"	"	

LIST

of persons who left the prison at Laufen from November 1st to December 16th.

No.	2. (Continuation) NAME	HOME		DATE OF DEPARTURE			REMARKS
		Place	Assize Town	Year	Month	Day	
54	Hirmer, Michl	Obernried	Cham	1873	Nov.	28	
55	Schuh, Mathias	Prüfung	Deggendorf	"	"	"	
56	Ebersberger, Andreas	Benedictbeuern	Tölz	"	"	"	
57	Berger, Johann	Solling	Erding	"	"	29	
58	Dempfle, Josef	Pfaffenhofen	Kempten	"	Dec.	1	
59	Fischbacher, Johann	Asten	Laufen	"	"	"	
60	Binder, Josef	Burlau	Passau	"	"	"	
61	Bittner, Anton	Dettenhausen	Illertissen.	"	"	2	
62	Tausend, Josef	Bleicha	Vilsbiburg	"	"	3	
63	Ostermaier, Josef	Zuchering	Neuburg a./D.	"	"	"	
64	Hoerl, Josef	München	—	"	"	"	
65	Bauer, Xaver	Daxstein	Deggendorf	"	"	"	
66	Metz, Carl	München	—	"	"	3	
67	Gross, Michael	Hubing	Bogen	"	"	4	
68	Hoff, Johann	Geiersthal	Neunburg	"	"	6	
69	Königsbauer, Johann	Dietelskirchen	Vilsbiburg	"	"	7	
70	Eicher, Josef	Lechhausen	Friedberg	"	"	9	escorted home
71	Brumbauer, Lorenz	Thanheim	Griesbach	"	"	10	
72	Heim, Josef	Oberreute	Kempten	"	"	11	as No. 70
73	Scholl, Mathias	Mittenwald	Werdenfels	"	"	11	ditto
74	Braun, Andreas	Amberg	—	"	"	11	ditto
75	Schnitzer, Simon	Eggenfelden	—	"	"	11	ditto
76	Loibl, Franz	Moosach	München l. I.	"	"	12	ditto
77	Fehringer, Sebastian	Kasing	Ingolstadt	"	"	14	ditto
78	Müller, Ferd.	Schwaben	Ebersberg	"	"	"	ditto
79	Resch, Josef	Stammham	Ingolstadt	"	"	"	ditto
80	Martin, Andreas	Hesselbach	Kronach	"	"	15	ditto
81	Durz, Benedikt	Kriegshaber	Augsburg	"	"	16	ditto
82	Roskopf, Josef	Tagmersheim	Donauwörth	"	"	"	ditto

The result of this extensive inquiry was handed in to me with the original accounts on the 2nd of April 1874. Before entering into a more minute discussion of the results, I will mention for the benefit of those, who are not personally acquainted with the state of things in the Bavarian prisons, some other circumstances in the prisoners' mode of life, which might have some relation to the introduction of cholera into the establishment or its further dissemination outside its walls.

It may be said that the prisoners enter the establishment naked, as it were, and leave the institution again in the same fashion. In the gaols for untried prisoners some at least still retain the clothes which they brought with them from other places. On entering a penal prison however, even before the prisoner is assigned to any department, he must completely strip himself, take a bath and put on the prison dress. The rules of the prison do not allow the prisoner to keep anything that he brings with him, not even a comb, or a pocket-handkerchief, not even a truss, when he has a rupture; even in this case he receives from the prison what is indispensable to him. *He gets everything from the institution.* His clothes, linen, and whatever else he brings with him, are cleaned and kept in a magazine, generally in store-houses of the establishment until his discharge. When the prisoner has been cleansed by the bath, and clad in the prison dress, he is brought before the director and the doctor, and not till then is he assigned to any department. Infecting matters therefore, so far as they do not reside in the persons themselves,

are certainly not easily introduced with the effects, which the prisoners bring with them into the prisons from other places.

The prisoners live either in their workrooms or in their dormitories, interrupted only by the walk to and fro between both, and a little exercise in the court-yard (promenade). The prisoners at Laufen remain in their dormitories solely for the purpose of sleeping, the period allotted to them for rest being from 7. 30 a. m. to 6 a. m. Between 5. 30 and 6 a. m. they make their beds, and wash their face and hands with the water they have taken with them in wooden pitchers from the well in the hospital court-yard the evening before. Meals are taken in the dormitories only on Sundays and festivals, on which days the prisoners spend their whole time in the dormitories, except during the afternoon walk, and the 1 hour's service in the afternoon. The day of the outbreak of the epidemic, November 29th 1873, was a Friday.

The linen (i. e. shirt, neckhandkerchief, pocket-handkerchief, stockings, towel, and drawers, when any of them wear the latter by medical order) are changed once a week on Saturday evening before retiring to rest in the dormitories, where they also wash their feet in wooden tubs with lukewarm water every Saturday evening. Each prisoner keeps the dirty linen on the chair at the bed-side on Saturday night, in order to deliver it up on Sunday morning, when it is taken to the laundry. The water in the foot-baths is removed from the dormitories on Saturday evening, immediately after it has been used, and poured into the nearest sink in the passages.

Articles of apparel can also be exchanged on this occasion, if they (trousers, jacket, cap, shoes, waistcoat) are too worn out or have become damaged.

The bed is a wooden bedstead for one person with straw mattress and straw bolster. Each prisoner has two sheets (an upper and under sheet) and blanket. The bed-linen (i. e. the two sheets) is changed every 4 weeks, the straw mattresses are re-stuffed once and the stuffing replenished three times a year. The cases of the mattresses and pillows are also changed on these occasions. The blankets are felled once a year, and beaten from time to time.

The sojourn in the workrooms lasts from 6 a. m. till 7. 30 p. m., except during the afternoon walk, and breakfast, dinner and supper are taken in the workrooms on working-days.

When a prisoner is to be discharged after having undergone his term of imprisonment, he first of all removes everything he has worn in the prison, takes a bath, and puts on again the clothes he brought with him on his admission, and receives back again out of the magazine the other effects he had with him. It is an exceptional case, when anything from the establishment is handed over to one of them in return for payment, where the clothes of the prisoners are unusually defective.

The prisoners at Laufen leave the establishment for the most part on a free footing, only a few are sent on under police escort. From Dec. 9th 1873 every discharged prisoner, except No. 71, was escorted to his home on account of the epidemic in the prison.

A. ATTACKS AFTER DISCHARGE, AND FURTHER DISSEMINATION OF CHOLERA CONSEQUENT THEREON.

The 82 prisoners discharged between Nov. 1st and Dec. 16th may be divided into two categories, viz, those who were discharged before, and those who were discharged after the outbreak of the epidemic. Those from No. 1 to 53 on the list belong to the first, the remainder to the second category.

Only two persons belonging to the first category were afterwards attacked with cholera or diarrhœa at other places, and the question arises, whether their attack can still be brought into connexion with their residence in the prison at Laufen, or not. At this time 4 individuals were not set at liberty, but 3, Nos. 21, 36 and 38 on the list, transferred to the police penal-workhouse at Rebdorf near Eichstätt, 1 individual, No. 15, removed to the prison at Amberg. The latter remained well. Of the 3 prisoners

removed to Rebdorf Josef Ney was attacked there with diarrhœa on Dec. 1st, from which he recovered, on Dec. 7th he was attacked with true cholera, from which he recovered on Dec. 17th. Josef Reiter and Josef Schober remained well at Rebdorf. As however the house epidemic had already begun in Rebdorf on Nov. 21st in the person of a prisoner despatched from Munich a short time before, it cannot be decided, whether the maladies of Ney were derived from Laufen or from Rebdorf. It might be assumed, that the attack of diarrhœa of Dec. 1st affecting a prisoner who had departed from Laufen on Nov. 23rd, had perhaps its origin there, and that the attack of cholera on Dec. 7th originated *de novo* in Rebdorf, but the former conclusion is at all events arbitrary and uncertain.

The second attack, a very violent case of diarrhœa, affected No. 45, Jakob Kindskofer, who had left Laufen on November 25th only a few days later than the previous case; but was attacked simultaneously with Ney. Kindskofer betook himself on foot to the nearest railway station at Freilassing near Salzburg on the day of his discharge from Laufen, and went by the next train to Munich, from where he proceeded without stopping to his dwelling at Friedenheim on the Pasing road No. 10 B, where he had lived with his wife and three children before his imprisonment at Laufen. He was attacked with diarrhœa about a week after, consequently about Nov. 30th or Dec. 1st, and was obliged to keep his bed 4 days. He did not call in medical aid.

This case of diarrhœa already excites great suspicion, that it had some connexion with the house-epidemic then being developed at Laufen, for if the diarrhœa was the diarrhœa of cholera, he could not easily have acquired it elsewhere. Neither the wife of Kindskofer, nor his children showed signs of sickness, either before or after, any more than his neighbours. Friedenheim adjoins that part of Munich on the Pasing road, which was involved only in the summer epidemic. No cases of cholera appeared in this district before or after the arrival of Kindskofer.

Although only 2 cases of diarrhœa showed themselves among the prisoners discharged before the outbreak of cholera, 2 undoubtedly severe cases occurred in the second category of discharged prisoners, No. 61 and 69, whose departure from the establishment coincides with the period of the actual outbreak of cholera. No. 61, Bittner, was employed as cleaner during his stay in the establishment. The following particulars about him are taken verbatim from the prison books:

Register No. 2283 Bittner; Anton, bricklayer, married, æt 40.

Occupation in the prison: cleaner.

Dormitory: No. 98.

Duration of imprisonment: 4½ months.

Illness in the prison: September: bronchial catarrh (treated out of hospital), — October: quinsy (treated in hospital).

Discharged on Dec. 2nd.

Bittner left the prison on the morning of Dec. 2nd, went to Freilassing, took the train to Ulm viâ Munich and Augsburg, and, without stopping, went from there on foot to Dattenhausen. As his money was not sufficient to defray the whole cost of the ticket to Ulm, he being obliged to borrow of an acquaintance on the way, he was forced to continue the journey without putting up at an inn for the night, and to limit himself to very meagre diet. He was moreover perfectly well on the way according to the report of the district-surgeon Dr. Burkhard at the district-office of Illertissen. Bittner did not make use of any privy on his journey, so far as he can remember. He arrived in Dattenhausen early in the morning of Dec. 3rd, quite tired and chilled with cold, but well. He is said to have indulged too freely this day in apple-cake, which his wife had prepared as a treat for him in honour of his return, and to have drank very much also. In the night of Dec. 3rd he was attacked with such violent diarrhœa and intense colic, that relief was sought at Dr. Lutz's of Illereichen the same night, and an emulsion containing Tinct. Opii was prescribed for him; in the morning the patient received a medical visit.

As Bittner had been directed to present himself at the district-office of Illertissen immediately on

his return, but was prevented by his illness, Dr. Lutz gave notice thereof and designated the malady *cholera nostras*, nothing being yet known abroad of the outbreak of cholera at Laufen, and not even Bittner himself having been aware of it on his departure. The district-surgeon requested him to at once send him a fresh report on the slightest suspicion of Asiatic cholera. The case quickly ended in recovery.

Only a few days later the outbreak of cholera at Laufen became known through the public newspapers, and the usual disinfecting measures were consequently now enjoined in Bittner's house, and carefully carried out for the most part by Dr. Lutz himself. Further attacks did not occur either in the family or in the place.

The second case affected No. 69. The notes of his case are as follows:

Number in register 2336. Königsbauer, Johann, oct. 27, peasant, married.

Occupation in the prison: taylor.

Workroom No. 38, dormitory No. 39.

Duration of imprisonment: 4 months.

State of health on admission: fair (Tuberculosis pulm.).

Illness in the establishment: October: Tubercul. pulm. Ol. jecoris (out-patient). November: Angina tonsill. (out-patient). Dec. 5th: Diarrhœa (out-patient).

Discharged Dec. 7th.

K. had already suffered from diarrhœa in the institution before his discharge, but succeeded in concealing its presence, and was thus discharged apparently well, just after the epidemic had reached its acme, when it was causing the greatest alarm throughout the prison. K. journeyed on foot from Laufen to Tittmoning and Altötting, and from there by coach to Vilsbiburg, and went through a complete attack of cholera on this tour in the course of 2 days, so that he arrived in Vilsbiburg in the typhoid stage of cholera. K. left the prison on the morning of Dec. 7th 1873, and taking the Tittmoning road, reached Löwenau in 3 hours, where he entered the inn, took two glasses of arrach and a small roll of bread, and had copious colourless evacuations. After leaving this place he had also severe vomiting, and hardly passed a village on his way without resorting to some privy in it. In the evening of the 7th of December K. came to the village of Kirchhain, a short distance from Tittmoning, drank here some warm wine and arrach, and ate a small piece of veal. He was frequently obliged to visit the privy at the inn during the night which he spent here. He reckons he had about 20 motions on the way from Laufen to Kirchhain.

On the morning of Dec. 8th the patient came to Tittmoning, entered the inn „Zur Post“, drank a cup of strong black coffee and a glass of arrach, and had vomiting and purging in the privy of the above-mentioned inn. In order to check the diarrhœa, he bought and ate some black gingerbread. After $\frac{1}{2}$ hour's stay, K. proceeded on his way to Burghausen, but leaving the latter on his left, took a nearer way in order to shorten his march to Altötting. After having deviated from the Burghausen road at Raitenhaslach, he crossed the Alz at Hohenwart, and reached Altötting viâ Emerting in the afternoon of Dec. 8th. K. had about 20 motions also on the way from Tittmoning to Altötting, frequent and severe vomiting, and in addition there was now violent, highly painful contraction of the abdominal muscles (spasms).

In Altötting K. betook himself first to the inn „Zur Post“, drank there a glass of arrach, and ordered some beef, which however he could not eat. Then he took a cup of strong black coffee at the Wessner inn, got after this some medicine at the chemist's, and visited a third inn near the shop of the latter. The patient repeatedly visited the privy at each inn.

At 5 o'clock in the evening K. mounted the stage-coach for Vilsbiburg. This was crowded with passengers up to the end of the journey, and although here and there some went off on a branch route, fresh comers always took the seats of those who had left. (The 8th of December 1873 was a high catholic festival, the conception of Mary, and Altötting is the most celebrated and most frequented place of pilgrimage in honour of the virgin in all Bavaria.) His fellow-travellers remarked indeed, that K. was ill, as he was frequently obliged to dismount on account of diarrhœa, but had no particular fear of him.

as the sick man avoided saying where he came from, in order not to be at once recognized as a discharged convict, which would have placed him in embarrassment.

The coach stopped an hour at Neumarkt on the Rott. K. was immediately obliged here also to visit the privy at the station, and then, tortured by the most violent abdominal pains, and shivering with cold, laid himself down in desperation on a *reeking dung-heap* which was near at hand, to get relief as far as possible, covering himself at the same time with fresh warm manure, and letting his motions pass under him.

Afterwards arrived at Vilsbiburg, he sank down exhausted, on dismounting from the coach, and could only with difficulty crawl to the hospital, where he was at once admitted.

K. had retained his full consciousness up to his entrance into the hospital, but then lost it rapidly, and lay 3 days without consciousness in the typhoid stage of cholera. On Dec. 15th he was sent cured to his home at Schindlbach in the district of Distels-Kirchen.

This account has been derived partly from the prison report at Laufen, and that of the district-officer at Vilsbiburg, partly from the report of the qualified surgeon Dr. Valentin Wille, who at my request sought out K., and questioned him minutely on the particulars of his remarkable wanderings.

We have here an infection experiment with the evacuations of a cholera patient *per anum et per oram* in a considerable number of places and houses, in privies and on dung-heaps, on the road, and in a crowded omnibus, such as it would of course be impossible ever to obtain legal authority to carry out. According to the theory of contagion we should have expected, that the whole route traversed by K. from Laufen to Vilsbiburg during his attack of cholera would soon have exhibited a series of cases of cholera and cholera epidemics; but not a single attack of cholera, not even a suspicious case was reported in any one of the many places, in which K. had left his evacuations behind him, not even among the numerous travellers on the stage coach.

None of those places, through which K. passed, had had cholera previously; it cannot therefore be assumed, that they or their inhabitants had been rendered insusceptible by a previous visitation.

Neither can this remarkable non-dissemination of cholera be attributed to any disinfection of the evacuations of K. Disinfection was nowhere resorted to, except in Vilsbiburg, where it was carried out according to the usual directions, and it could be assumed only in the case of Vilsbiburg, that it had been protected by disinfection. Disinfectants had been employed nowhere but in Vilsbiburg, nor was their employment possible under the given circumstances, for K. who alone could have mentioned all the places where he had been and left behind evacuations, was unconscious for 3 days after his arrival in Vilsbiburg. It is moreover a fact, that no instructions were afterwards sent from the authorities at Vilsbiburg to any of the above-mentioned places, that they should adopt precautionary measures there. Nobody would have known, where the lever of disinfection, which appears so powerful to many, had to be applied.

This grand fact must bring conviction home to every unprejudiced mind, that the propagation of cholera was probably not prevented either in the preceding case (Bittner) in Dattenhausen by the disinfection which was subsequently carried out according to rule.

No other of all the remaining convicts discharged during the course of the epidemic from Nov. 28th to Dec. 16th was attacked with cholera, either in its severer or milder form. One of the two attacks which took place, viz, that of Bittner may even be regarded as choleraic diarrhoea, for violent as the case was in other respects, he did not vomit, as he himself and Dr. Lutz assured me.

None of the discharged prisoners died of cholera, not even the consumptive Königsbauer, who does not, it is true, appear to have had any opportunity of committing any error in diet on his journey, but was all the more exposed to other hardships and particularly to cold. As is evident from the account of Dr. Berr, the mean temperature at Laufen was 3° (Reamur) below zero on Dec. 7th, 4° on the 8th, and 2½° on the 9th. It will not have been much otherwise at Tittmoning, Neuötting and Vilsbiburg. He wore

nothing on his body but the clothes, which he had on in August, when he entered the prison to work out his time.

No workroom, no dormitory, no division in the prison exhibited such a mild rate of sickness and mortality during the course of the epidemic, as this division of 29 prisoners, discharged during its prevalence, who were at liberty to commit all kinds of errors in diet and other excesses. In strict justice 2 more should be deducted from these 28, viz, the two discharged on Dec. 16th, Durz and Rosskopf. They had already had the cholera in the prison, their individual disposition may therefore be looked upon as exhausted, they had become, so to say, pest-proof.

Rosskopf, a weaver in dormitory 99, 18 months in confinement, was, as is well known, the first case of cholera in the prison. Durz (straw-worker, dormitory 48) was attacked with cholera on Dec. 4th, left the hospital cured on the 15th, and was discharged from prison on Dec. 16th, having been 1 year and 1 month in confinement.

Of the remaining 27 discharged prisoners, only Fehringer, No. 76, farm-labourer, and Müller, No. 78, spectacle-maker, had diarrhœa during their residence in the prison, which could not exert any protective influence against an attack of cholera.

Assuming now these 27 to have been not yet pest-proof, there occurred among them

1 case of cholera	= 3.8 per cent	} 7.6 per cent.
1 „ „ choleraic diarrhœa	= 3.8 „ „	
— death	= — „ „	

There are many divisions now in the prison comprising similar numbers, 12 brush-makers, 20 farm-labourers, 20 locksmiths, 21 joiners, 22 rope-makers, 36 spinners, 26 washers, and 36 weavers, each of which suffered far more. It is clear from this circumstance, which appears to me to be of fundamental importance, that quitting a centre of infection acts more certainly, than all disinfecting remedies, and all hospital arrangements and methods of treatment.

The English have experienced this in India for years, both in barracks and in prisons. As often as cholera breaks out in such a building, movement is the order of the day.

It is also interesting to observe, that this change of quarters has the same salutary effect under the rude northern sky in the cold of winter, as under the warm sun of India. Just as the cholera has already furnished sufficient proof of its being independent of the temperature of the air, by wandering from Calcutta to Archangel, from the Indian Ocean to the Arctic Sea, it has also shown us again very distinctly in the December epidemic at Laufen, that it is immaterial to it, whether it is cold or warm weather. These circumstances will at length compel us, to trace the influence of seasons on the prevalence of cholera, which is an evident fact in India as with us, to something else than the temperature of the air, or the conditions of intercourse.

B. FURTHER DISSEMINATION OF CHOLERA THROUGH THE MEDIUM OF DISCHARGED PRISONERS WHO REMAINED WELL.

The questions, which the Bavarian Minister of the Interior addressed to all the district-officers about the convicts discharged from Laufen, had reference not only to those discharged prisoners who might be attacked, but demanded also, „whether, though they themselves may not have been attacked, anybody has been attacked with choleroïd symptoms in their immediate neighbourhood, in the houses, in which they slept or stopped some time, and whether the persons thus attacked have come in close contact with the prisoners discharged from Laufen.“ These points were investigated in each of the 82 cases, but always with a negative result.

In order to give some idea how these investigations were carried out, I will communicate one or

two examples. For instance Josef Dempfle, of Pfaffenhofen, in the district of Kempten in Schwaben, was discharged on Dec. 1st.

Register No. 1653. Dempfle Josef, 37 years old, married, cottager.

Occupation in the prison: spectacle-maker.

Workroom No. 84; dormitory No. 94.

Duration of imprisonment: 17½ months.

State of health on admission: tolerable.

Illnesses in the prison: August 1872: eczema of ear (out-patient); October: prosopalgia (in-patient); November: panaritium (in-patient); July 1873: intermittent headache — oligæmia; November: gastric fever.

and the injunction to investigate this case was first sent to the district officer at Kempten. — The latter despatched the following report to the Minister of the Interior, dated January 13th 1874:

„Dempfle, Franz Josef, of Pfaffenhofen, parish of Haldenwang (No. 58 on the list), discharged from Laufen on Dec. 1st, presented himself to the district-officer on Dec. 5th 1873, and was directed to go to his home, stopped there however only one night at his mother's, and betook himself then to Altstättan in the district of Sonthofen. Information to this effect was sent to the district-officer of the latter place with a view to further inquiries.

In Pfaffenhofen he has not left behind him either clothes or other articles, and neither cholera itself, nor choleroïd disease have occurred there in consequence of his stay.“ —

Besides the district-officer of Kempten, the list was also presented to the town magistrates of Kempten, as being a police-board, and they send word under date of Jan. 7th 1874: „that none of the prisoners discharged from the prison at Laufen between Nov. 1st and Dec. 16th 1873, has taken up a fixed or temporary residence in the town district of Kempten; on the contrary the convict Karl Galliér of this place was removed from Laufen to the gaol here, to be tried before the district judge at Kempten, and again sent back again to Laufen on Nov. 26th, to undergo the rest of his punishment. No case of cholera or choleroïd disease has however happened in the gaol here, induced by this or any other cause, nor can the few choleroïd attacks, which have hitherto occurred in this town, have any connexion with the transport of Galliér to this place.“

The district-officer of Sonthofen had to conduct the further investigation about Dempfle. He proved first his residence in Altstättan, summoned him to his office, where he declared on affidavit under date of January 17th 1874:

„After my discharge on Dec. 1st last year I went by coach from Laufen to Freilassing, and from there by rail to Munich, where I stayed 2 days, and passed two nights at the Schimmel inn. On the third I went by rail from Munich to Kempten, where I arrived at 2 p. m., and betook myself at once to Pfaffenhofen, where my mother, Veronika Dempfle, a widow, resided. I remained at hers until Saturday, the 6th of December, returned then to Kempten, presented myself at the district office, and went directly afterwards to Altstättan to my wife, with whom I have since been living.

Neither on the journey home from Laufen, nor since my return, have I been attacked with cholera or any symptoms resembling cholera, nor since this time have either my wife, or my mother, or persons about them, or those who came in contact with me, been attacked with similar symptoms. Nor have any of my seven children living at home become ill with such symptoms.

I have not parted with any of the clothes or other articles which I took with me out of the prison, either on the journey, or since I have been living at home.

I am not able to say whether any persons at the Schimmel in Munich, who came in contact with me, were attacked, and have only to remark further, that I had a room alone there.

I have nothing else to relate.

(signed)

Josef Dempfle.“

The district officer at Sonthofen now instituted further inquiries as to the consequences of Dempfle's stay at his mother's in Pfaffenhofen, and learned the same particulars which the district-officer at Kempten

had communicated to the minister on Jan. 13th 1874. He applied also through the city-magistracy of Munich to the Director of Police at Munich for information about the 2 days stay of Dempfle at the Schimmel inn. The police-officer of the district in question sent in the following report, dated January 28th 1874:

„During the cholera epidemic in the summer months an unmarried labourer fell ill, and died at the Schimmel inn, No. 1 Dachauer-Strasse, he however did not occupy any bedroom, but slept in the stable. Neither cholera nor any similar malady occurred in the above mentioned inn, either before or after this attack.“

Lastly a further inquiry was made of the brigade of gendarmes at Sonthofen, whether, and if any, which of the persons mentioned in the list, were still residing anywhere in the district, and, excepting the case of Josef Maier (No. 50), whose case was investigated in the same way as that of Dempfle, negative answers were received.

In other cases it was not always so easy to come at the facts, although at last the track was discovered.

Andreas Heilmaier, of Schrobenhausen (No. 33 on the list), 28 years old, discharged from Laufen on Nov. 21st, went at once to Freilassing, and from there by rail to Pfaffenhofen, a railway station between Munich and Ingolstadt, going on apparently without stopping the night to Schrobenhausen, where he presented himself before the district-officer, „withdrew however from the district after a day or two according to his wont, and his present abode cannot be ascertained. At all events he has not been ill since, otherwise the magistrates of this place would certainly have received intelligence of it, as Heilmaier has a partiality for visiting hospitals at the cost of his parish.“ Schrobenhausen, the 9th of January 1874.

This Heilmaier reappears however elsewhere at a later period. The district-officer at Traunstein sent the following report dated Feb. 4th 1874:

In compliance with the request of the Minister of the Interior, we beg to state as follows:

„No person belonging to the district of Traunstein is mentioned in the enclosed list of persons discharged from the prison at Laufen; Andreas Heilmaier however of Schrobenhausen, who appears as No. 33 in this list, is at present in the district prison charged with theft.

Said Heilmaier betook himself on Nov. 21st 1873, on which day he was discharged from prison, to Dachau, via Freilassing and Munich, and stopped the night, apparently in the period between Nov. 21st and the 29th, in the following places, viz, Dachau, Niederschenern, district of Pfaffenhofen, Schrobenhausen, Altomünster, district of Aichach, Erling, district of Munich left of the Isar, Polling, Uffing and Murnau, district of Weilheim. On the 30th he passed the night in a village near Partenkirchen, and wandered about in the Tyrol from the 1st to the 29th. He could not mention the places in the Tyrol, where he spent the night. On Dec. 30th he returned to Bavaria, remained during the night in Obersiegsdorf, Bergen and Chieming, district of Traunstein, during the interval between Dec. 30th and Jan. 3rd 1874, and was apprehended at Chieming on the last mentioned day.

According to the communications received from the respective district-officers, and the further inquiries which the undersigned officer was enabled to make, nobody has been attacked with cholera or choleroïd symptoms in the immediate vicinity of Andreas Heilmaier, or in the houses, where Andreas Heilmaier passed the night or stopped some time. Nor has Andreas Heilmaier himself been attacked with cholera or such-like symptoms since leaving the prison.

The clothes and other articles, which Andreas Heilmaier took with him out of the prison, he kept also during his wanderings.“ —

It would be wearisome, to communicate all these careful and comprehensive investigations, the great value of which every professional man will acknowledge in studying the etiology of cholera, although only negative results were obtained. It only remains for me, to express the thanks of the Cholera Commission of the German Empire and the thanks of science to the Bavarian Ministers of Justice and of the Interior, for having promoted the solution of this problem by every means in their power.

THE EPIDEMIC OF CHOLERA AT KÖSTLARN.

I have only one other important fact to mention by way of conclusion to my investigations relative to the individuals discharged from the centre of infection at Laufen.

An epidemic of cholera began in the market-town of Köstlarn, in the district of Griesbach in Lower Bavaria (Landshut), numbering 880 inhabitants, on Jan. 7th 1874, and lasted till Jan. 24th, occasioning 17 attacks and 9 deaths. This little epidemic is interesting in many respects. The report of the district-surgeon Dr. Stömmer of Pfarrkirchen is as follows:

Pfarrkirchen, Jan. 24th 1874.

„In obedience to ministerial instructions received by telegraph at 8 o'clock last night, I betook myself to Köstlarn this morning.

I began at once to examine the circumstances likely to be influential. The market-town of Köstlarn is situated on the slope of a hill, and only 2 roads extend right and left along the valley into the plain. These two roads are 50 paces from the bottom of the valley. The valley is traversed by a small brook, on the other side of which the ground again rises.

The ground of this valley, as well as the meadows there situated, are moist. One of the two roads, viz, the one running to the south-west, contains the cholera focus in its central portion, 5 houses standing in the immediate vicinity of each other on both sides of the narrow street having been and being still attacked by it.

The ground, on which the market-town of Köstlarn stands, consists according to the account of the mayor Herr Stöfl, a builder, of a layer of loam about 15' thick, below which there is a blue sandy stratum 1—2' in thickness, and immediately below this ground-water.

It was in this deep-lying part of the market that the greater number of the 56 cases of typhoid also appeared in the year 1865, nor did they extend even to the immediate vicinity.

Köstlarn had a small epidemic of small-pox in 1867.

I shall preface my enumeration of the attacks which have hitherto occurred with the remark, that a prisoner named Lorenz Brummbauer, about 34 years old, who had been discharged from the prison at Laufen on the 10th of December, arrived at Köstlarn on Dec. 19th with a small bundle of clothes, and put up for the night at Gruber's inn, where there had not hitherto been any case of cholera, and stopped at Köstlarn during the day-time, and partly also at night, until the 20th of this month, although his home is at Leiten, a neighbouring place in the parish of Thanham. This man is said to have held some intercourse with the man first-attacked (Angerer), and especially to have drunk with him on Jan. 7th.

The following are those who have been hitherto attacked:

1) Josef Angerer, æt. 39, labourer, after suffering some time from diarrhœa, was attacked with violent purging and cramp in the calves on Jan. 7th at 11 p. m. He did not send for medical assistance, but was „charmed“ by a cottager for the cramp. He died on the 8th at 7 p. m., and was buried at 10 p. m.

2) His father-in-law, consequently father of the widow, named Michael Peter, æt. 63, followed the body to the grave, took part in the funeral repast, spent the whole day in public-houses, entered the house of his widowed daughter in the evening, and passed the night there in the bed of the deceased, was attacked however the same night at 10 o'clock (Jan. 10th) with vomiting and diarrhœa with spasms, which were followed by the stage of asphyxia or rigors, and he died in the typhoid stage on the 16th.

3) Josef Moser, æt. 63, meal-man living in the neighbouring house, kept watch during the night in the room of the deceased Angerer, and was attacked with true cholera on the 10th; he died in the typhoid stage on the 14th.

4) Anna Unterrollmaier, 46 years old, a married working-woman, was with the dying Angerer, in whose neighbourhood she also lived, was attacked immediately afterwards with slight diarrhœa, on the 10th inst. however had frequent, though not characteristic rice-water evacuations, and recovered without medical treatment.

5) Kreszens Moser, grand-daughter of the above-mentioned Moser (No. 3), 6 months old, was attacked with cholera on the 12th inst., and died on the same day.

6) Josef Moser, brother of the preceding, æt. 2½ years, was attacked with vomiting and diarrhœa on the 12th inst., and recovered.

7) Peter Mühlshuster, 17 years old, journeyman shoemaker, was attacked with slight vomiting and

diarrhœa without cramp on the 12th inst., was ill one day and recovered. The source of contagion is unknown here: his dwelling is not near the centre of infection.

8) Georg Abtmaier, 67 years old, farmer, living 50 paces below the houses forming the focus of the disease near the brook, did not apparently come in contact with the cholera patients, not even going out of his house, as he was suffering from an ulcer; was attacked however with cholera on the 14th inst., soon became asphyxiated, and died on the 16th.

9) Anton Putz, 2 years old, son of a joiner, living opposite Angerer, was attacked with choleraic diarrhœa on the 14th, and recovered.

10) Josef Zehentleitner, 11 weeks old, son of a cottager, living near Angerer and Putz, was attacked with choleraic diarrhœa on the 15th, and recovered.

11) Karl Sebeck, æt. 46, journeyman joiner at Putz's (No. 9), highly consumptive, was attacked with vomiting and diarrhœa with cramp in the legs on the 15th, and died in the typhoid stage in the hospital on the 20th.

12) Kreszens Moser, æt. 25, daughter of No. 3 and mother of No. 5 and 6, was attacked with choleraic diarrhœa without spasms on the 16th, and recovered. She lived with her children on the 1st floor, but visited her sick father with them, who lived in the same house on the ground-floor.

13) Maria Vockinger, æt. 32, wife of millwright, was in Moser's house to see the sick or dead child, was herself attacked with choleraic diarrhœa on the 19th, and is now convalescent. She does not live in the vicinity.

14) Franziska Scharthl, æt. 54, a married labouring-woman, and sister of Moser (No. 3), was attacked with choleraic diarrhœa on the 19th, and is now convalescent. She also does not live in the vicinity, but went to Moser's.

15) Josef Ranzinger, foster-child, 10 weeks old, lives opposite Moser, was attacked with true cholera on the 22nd, and is at present moribund in the algid stage. †

16) Anna Preisinger, æt. 64, widow of a carpenter, lives in the same room as the child just mentioned, kept up intercourse with Moser, and after having had diarrhœa for some days, was attacked with true cholera on the evening of the 23rd; she is at present moribund in the stage of asphyxia. †

17) Franziska Koch, æt. 43, single, was attacked this morning (24th) with vomiting and pain in the abdomen, and has brown liquid evacuations, which seem to be gradually assuming the characteristic appearance. She is suffering from choleraic diarrhœa at present however. Contagion cannot be proved. She lives at the opposite end of the lower market-place, in a house in the street running eastward. These latter houses belong to the neighbouring parish of Hübrenth.

The police regulations, which have been enjoined for the most part by the district officer, who was himself in Köstlarn on the 19th, are very appropriate, and are zealously carried out. The mayor, Georg Stöfl, 45 years old, is a very intelligent and zealous man, as also the barber-surgeon, Fortmüller, 33 years old, to whom was intrusted the disinfection of the public buildings and inns. The latter acts also as deputy-coroner. There is no surgeon in the place, the 2 nearest surgeons living at Rothalmünster, half an hour's walk from Köstlarn.

Children living in the surrounding villages are not permitted to frequent the schools. I proposed that the schools should be closed altogether.

A special cholera hospital does not exist, indeed there is not even an ordinary hospital, but only 2 sick wards in the public-hall. As too these wards are for the most part unused, and 1 cholera patient had already died in them, I proposed that they should in future be employed only for cholera patients, until the epidemic had become extinct, and they had been thoroughly disinfected, but that other patients should be lodged elsewhere. The requisite disinfection in the dwelling of the cholera patients, and of their evacuations and privies, their linen, bed-clothes and apparel have been enjoined.

Disinfecting agents are present in sufficient quantity. Sulphate of iron is to be had in the shops; the barber-surgeon keeps a supply of carbolic acid. A store of opium, Tinct. Opii crocata, Hydrochloric Acid, Camphor and Acetic Ether are also to be found at the barber's, so that the surgeon can procure the most essential drugs there immediately after his visit to the patient.

A dead-house does not exist: I proposed, that some place, a shed for instance or the like should be sought for, in order that the bodies might be removed there as soon as possible.

Bearers are appointed; I proposed that the bodies should be driven.

The instructions given by the superintendent of police will be again published in the parish to-morrow.

The sanitary board have done their work well. The drinking-water is good; only 2 years ago Köstlarn constructed, at a cost of 1400 Florins, a water-conduit 8144' long from a neighbouring wood situated on a hill, which is also serviceable in case of fire.

The houses constituting the focus of the disease have not hitherto however derived their water-supply from this conduit, but from a pump; the other houses of this portion of the market have done so also.

Much prejudice and want of intelligence still prevail among the inhabitants. Many deny the nature of the disease, and oppose the measures prescribed. I have therefore proposed to give frequent instruction in public meetings.

I have thoroughly discussed everything, that has to be done, and how it has to be done, with the mayor, the barber-surgeon, and the visiting surgeon in charge of the cases.

The customary night-watching is a great evil. It is a general custom here, namely, that 20 or more persons assemble together, and remain the whole night with the body, drinking beer and spirits, and praying for the deceased. The disease can very easily be contracted at such meetings, and disseminated through the whole town.

I urgently advised the mayor to prevent these meetings by means of the police, or at least to allow them to be held only in a house free from cholera at a distance from the house of death, and he promised to do so at once.

I likewise proposed speedy interment of the bodies, about 12—24 hours after death. —

Dr. Brunner went also to the place on Jan. 28th, and furnished a report. He confirms the account of the district-surgeon in all essential particulars and adds:

Landshut, Jan. 30th 1874.

Directly adjacent to the group of houses representing the focus of the disease, and at the end of the short and narrow boggy road, there rises an eminence some hundred feet high, which sends down a considerable quantity of moisture to the bottom of the valley.

In this lateral street there are two pumps, which for the sake of convenience have hitherto been used by the inhabitants not only for culinary purposes, but also as drinking-water, although the new water-conduit more than 8000' long, supplies excellent water in the middle of the market-place at a distance of less than 2 minutes' walk.

The water of the wells is also physically good, being bright and clear, as well as fresh and soft, as the undersigned convinced himself of personally, and the new water-works seem to aim more at the quantitative than the qualitative improvement of the supply of water.

The privies, not only of the group of houses forming the focus of the disease, but throughout the whole place, are as everywhere in the country, of the most primitive construction, are mostly situated outside the houses however, often indeed some paces distant from them.

The traffic in the place is tolerably lively in spite of its remote situation, commercial travellers making their way in great numbers from the neighbouring railway station at Simbach viâ Köstlarn to the prosperous Rotthal, then in the direction of Passau and Vilshofen, or vice versâ.

As regards the origin of the disease in Köstlarn, its introduction may be attributed, though not with absolute certainty, yet with extreme probability, to the prisoner Lorenz Brummbauer discharged from Laufen a few weeks before. This view is supported by the facts:

1) that any other mode of origin of the disease is absolutely excluded according to investigations of the most comprehensive nature, and especially that not even one suspicious attack has occurred in any of the inns at Köstlarn frequented by travellers.

2) that it is not merely one or two sporadic cases, of choleraic diarrhœa as it were, with which Köstlarn was visited, but a very respectable, and considering the mortality, indubitable and numerically important epidemic of cholera; finally

3) the circumstance, that the prisoner Brummbauer, discharged a short time before from an intensely affected cholera-house, after loitering about for weeks in the district, and especially in the market-town of Köstlarn, had, as has been demonstrated, held intercourse during this time and directly before the appearance of the first case of cholera with this very Josef Angerer, this consumptive, and therefore specially predisposed, because extremely reduced individual. Predisposition plays the principal part as is well known, in all epidemics, and naturally in cholera also, without which we should have to record far more terrible sick-rates and death-rates in all epidemics.

The undersigned no longer entertained any doubt as to the nature of the epidemic attacks in Köstlarn,

viz, that they were cholera asiatica, and consequently introduced, from the moment, in which he saw, the remaining patients with all the characteristic symptoms of the pernicious disease, so that, under such circumstances, it seemed wholly unnecessary to undertake a post-mortem examination for the sake of diagnosis — a proceeding attended, as is well known, with considerable difficulties under the circumstances which prevail in the country.

Further researches showed, that only 4 of the 17 cases of cholera occurred outside the above-mentioned cholera focus, moreover in each case contact with persons in the cholera centre, or, as in the case of Franziska Koch (No. 17), with bearers from it (her brother who remained exempt, because not predisposed, is a bearer), can be demonstrated.

With regard to the treatment and the means adopted to prevent the dissemination of cholera in Köstlarn, as soon as knowledge of its appearance was once obtained, all due acknowledgment must be given to the respective boards and surgeons. During the course of the first three cases nobody in the town had the most remote belief in the existence of the malady, as the death of a consumptive and two aged, likewise weakly, men was regarded as a very natural event, and only the surgeon, summoned at the last moment of the illness of Nos. 2 and 3, was able with great difficulty to overcome and remove the prejudices against the idea of its being cholera.

From this moment public boards and official surgeons in conjunction with the intelligent mayor of the place, and the practical, and, as regards disinfection, especially trustworthy local surgeon, employed all their energies; and the existing ordinances, and executive regulations against the dissemination of Asiatic cholera (Ministerial decree of November 11th 1872) were put in full force.

Although the epidemic of cholera at Köstlarn cannot yet by any means be regarded as ended, yet the cessation of the malady during 5 or 6 days (January 24th—28th) is in some measure reassuring.

Ample care has been taken to provide means for isolation, in case of any fresh attacks, by preparing the workhouse as a temporary cholera-hospital, the situation of which on an airy eminence, with firm, not sodden soil; its internal arrangements with separate rooms for men and women containing 4 beds each, its privy outside the house and communicating by means of an open passage only protected towards the north — may be considered as corresponding to the sanitary and hygienic requirements of the case.

Removal of the healthy, the most salutary measure indeed in case of the existence of a typhus and cholera-centre — is impracticable, considering the notoriously poor and crowded population of the market-town of Köstlarn, and the want of appropriate municipal buildings.

R E V I E W

of the attacks of cholera in Köstlarn, district of Griesbach, between January 7th and 28th 1874.

No.	NAME	AGE	DAY of Attack	NATURE of Attack	Issue of the Disease			Treat- ment		REMARKS
					recovered	died	under treatment	without	with	
1	Angerer, Josef	39	7. Jan.	Cholera	—	† Jan. 8	—	1	—	under treatment only a few hours before death. do.
2	Peter, Michael	63	10. "	"	—	† " 16	—	—	1	
3	Moser, Josef	63	10. "	"	—	† " 14	—	—	1	
4	Unterrollmaier, Anna	42	10. "	{ Choleraic diarrhoea }	1	—	—	1	—	moribund when taken under treatment.
5	Moser, Crescenz	6 mos	12. "	Cholera	—	† Jan. 12	—	—	1	
6	Moser, Josef	2½	12. "	"	1	—	—	—	1	
7	Mühlschuster, Peter	17	12. "	"	1	—	—	—	1	
8	Abtmeier, Georg	67	14. "	"	—	† Jan. 16	—	—	1	
9	Putz, Antod.	2	14. "	"	1	—	—	—	1	
10	Zehentleitner, Josef	11 wks	15. "	"	1	—	—	—	1	
11	Sebeck, Carl	46	15. "	"	—	† Jan. 20	—	—	1	
12	Moser, Crescenz	25	16. "	{ Choleraic diarrhoea }	1	—	—	—	1	
13	Vockinger, Maria	32	19. "	Cholera	1	—	—	—	1	
14	Schartl, Franziska	54	19. "	"	1	—	—	—	1	
15	Ranzinger, Josef	10 wks	22. "	"	—	—	1	—	1	
16	Preisinger, Anna	64	23. "	"	—	† Jan. 24	—	—	1	belongs to the adjoining pa- rish of Hubreit.
17	Koch, Franziska	43	24. "	"	—	—	1	—	1	
Total . .					8	7	2	2	15	

concluded KÖSTLARN, the 23th of January 1874.

Dr. Brunner.

This case is in so far of importance, as it seems to prove the conveyance of cholera from Laufen to another place by a discharged, though healthy prisoner, and to form the only exception to the common rule. At first sight, and considered in the light of the views which still prevail at present on the mode of distribution of infectious diseases, there arises at once a certain probability, that the coincidence between the arrival of Lorenz Brumbauer and the outbreak of cholera at Köstlarn was perhaps no accident after all. Neither individual cases of cholera, nor epidemics appeared anywhere either before or afterwards in the so thickly populated neighbourhood of the market-town of Köstlarn. The epidemic at Köstlarn appeared quite isolated both as regards place and time, and it would be desirable to have some explanatory reason for it. Brumbauer was discharged from the prison at a time, in which attacks of cholera were still occurring, although the principal burst of the storm was already over, and he brought various articles with him. This very much favours the view of the possibility of an influence, which he might have exercised in some way or other.

On the other hand this view is opposed by the fact, that a pretty long interval elapsed between the discharge of Brumbauer from Laufen and his arrival in Köstlarn. From Dec. 10th to the 18th makes 8 days. Then Brumbauer had always been well both in the prison and afterwards. His prison history is as follows:

No. in Register 2347. Brumbauer, Lorenz, single, æt. 31, butcher.
 Occupation in the prison: spinner.
 Workroom No. 57; dormitory No. 97.
 Duration of imprisonment: 3½ months.
 State of health on admission: robust.
 Illness in the prison: none.
 Discharged from prison on Dec. 10th.

It is therefore necessary, not only to trace out exactly his course from Laufen to Köstlarn, but also minutely to investigate his communications in Köstlarn,

Brumbauer himself could no more be examined on the subject, for at the time, when this had become of interest, he had already taken himself off, and his place of abode could no more be ascertained. Sufficient facts have however been gleaned in the course of the investigation to give a correct idea on this question. It is quite certain that he re-appeared in Altötting on the 12th of December, where he came to his former master Georg Leibenger, and wished to be again in his service. Leibinger declared on affidavit on Jan. 12th: „The journeyman butcher, Lorenz Brumbauer of Thanham in the district of Griesbach, was in my service before he went to Laufen to undergo his sentence. On the 12th of last month he arrived at mine from there, and remained till the following day. Where he passed the night on the 10th and 11th, before he came to me, I do not know, nor whether he came to me on foot or by coach. He had only those articles of dress with him, which he wore on his body. He passed the night at mine in a journeyman's bed. He went off again on Dec. 13th, because I did not take him into my employ again, and the district-officer also objected to his stopping. Where he took himself to, and what became of him afterwards, I do not know, as I have heard nothing more of him. Disinfection was carried out in my dwelling according to official directions, and nobody has been attacked with cholera or choleroïd symptoms.“

The district-officer at Altötting remarks in addition, that Brumbauer had been directed to the district officer at Griesbach, where he probably also presented himself. The documents reveal nothing on this head.

I considered it most important to make inquiries in Köstlarn itself about Brumbauer, who at all events after the outbreak of the epidemic must have become an interesting personage there. I applied therefore by letter in May 1874 to Herr Stöfl, the mayor of Köstlarn, whose circumspection and trustworthiness were known to me from the reports of the district-surgeon and Dr. Brunner. Herr Stöfl sent me the following communication dated May 15th 1874:

„As far as can be ascertained, Brumbauer took the road to Altötting and Rotthalmünster; he is said to have stopped in Munich and Altötting*), but this statement cannot be verified, as Brumbauer has long been absent again from here. Brumbauer arrived here on Dec. 19th, and passed the night at Gruber's inn. He wore some of the clothes he brought with him from the prison at Laufen, whilst the rest were sent on here to Gruber's the next day in a carpet-bag from Rotthalmünster, where he passed the night at Ostermayer's inn. Brumbauer stayed from Dec. 20th to Jan. 4th 1874 at his mother's and his cousin's in Leiten ($\frac{1}{2}$ hour's walk from Köstlarn), who both live in the same house, dined at his mother's, 65 years old, and slept during the night at his cousin's, 66 years old, in one and the same bed. There were besides in this house his cousin's wife, Maria, 59 years old, and his mother's sister, Maria Brumbauer, 64 years old. Brumbauer was constantly in their society, without one of them being taken ill.

„Brumbauer came daily from Leiten to Köstlarn, and associated with various acquaintances in the public-houses. On Jan. 4th Brumbauer removed his quarters to Köstlarn, and took lodgings at Georg Stiedl's, labourer, 40 years old. There were also living there Maria the wife of Stiedl, æt. 43, and their boy æt. 9. Brumbauer was also in the society of these persons until Jan. 15th, without one of them being attacked. At the same time he renewed his visits to the public-houses, especially that kept by Kopffhammer, where he stopped half a day at a time, often drinking out of the same glass with his friends, without one of them being the worse for it.

„On the 15th of January Brumbauer left here for Simbach on the Inn, it is said. He wore the clothes and linen he had brought with him during his residence in Leiten and Köstlarn, had them washed by the hospital laundress, a woman a little more than 60 years old, without her being attacked. No symptoms of cholera appeared in Leiten and Thanham.

„According to the statement of Benedikt Schiedlmeier, publican, and his wife Margarethe, Angerer (the first case of cholera at Köstlarn) played cards with Brumbauer for about an hour 2 or 3 days before his death. It is not asserted that he drank with Brumbauer on the evening of the 7th (Angerer was attacked with cholera on this evening), and the fact is positively denied by Angerer's widow.

No case of cholera is known to have occurred after Jan. 24th.“ —

Such is the report of a thoroughly impartial man! After this series of indubitable facts, I have at length abandoned the idea of there still being any connexion between the arrival of Brumbauer and the epidemic of cholera at Köstlarn, although at first one circumstance repeatedly tempted me to think so. Sixteen, namely, of the 17 cases of cholera which occurred, affected inhabitants of the narrowly circumscribed cholera district, or such as had been visitors in the houses there. A single case forms an exception, Peter Mühlshuster, No. 7 on the list, who was attacked with choleraic diarrhoea on Jan. 12th, which quickly terminated in recovery. This young man worked as journeyman at a shoemaker's in the more elevated part of the hamlet, in a house, where no one else fell ill, and slept at his parents' house, which like that of Franziska Koch, the sister of Michael Koch, who nursed the sick and laid out the bodies in the infected houses, was situated outside the cholera district, and in which also no one else was attacked; but Mühlshuster had resoled a pair of boots for Brumbauer, about which however I could not find out, whether they had been brought over from Laufen or were another pair. Mühlshuster was the only one of all the persons affected with choleroïd disease, who had never come in contact with the cholera localities or persons out of them. The coincidence however of the choleraic diarrhoea of this journeyman shoemaker and the soling of Brumbauer's boots seems to me now just as accidental, as the coincidence of the pump in the low-lying cholera districts of Kästlarn with the immunity of the more elevated part of the hamlet with its iron reservoir, into which an abundant supply of good water is poured, conducted thither from a spot half an hour's walk distant, and at a cost of 12000 Florins.

*) Brumbauer seems to have gone from Laufen to Freilassing, and by railway to Altötting via Munich, which would exactly fill up the time, till he came to Leibingers' inn.

All adherents of the drinking-water theory will indeed claim this case to be one in their favour, and ask in astonishment, if not in positive indignation, how I can venture to make such a bold and arbitrary assertion, but I have a reason for it. This drinking-water conduit has only existed about three years. In the year 1865, when these water-works were not yet in existence, the market-town of Köstlarn had a violent epidemic of Typhoid, according to the statement of Dr. Stömmmer the district-surgeon, 56 cases, which, like the cases of cholera on this occasion, were limited essentially to the low-lying part of the town. Munich had also a very violent epidemic of typhoid in the winter of 1865—66, and the coincidence of the winter epidemics of cholera in Köstlarn and Munich in 1873—74 has much more weight with me, than the one hour's game at cards of the strolling prisoner Lorenz Brumbauer with the consumptive Josef Angerer, and the intercourse of the former with the boot-soling Peter Mühlshuster. I prefer therefore to pass over these trifles, although they would have been very convenient for me at the time to enable me to give a contagionistic explanation, than to give up great general points of view, which are calculated to lead us further, and have already conducted us to some fixed principles.

And therefore the mighty and terrible outbreak of cholera in the prison at Laufen turns out to be a local event sharply circumscribed in all directions. The great focus of infection, which had been formed there, has not become a centre of infection to other places which kept up a manifold intercourse with it; it cannot therefore be compared to a vegetable unit, which supplies all the environs with seeds, but rather to a volcano, the liquid lava of which hardly pursues its devastating career to its foot, whilst the cinders, often hurled far and wide from its glowing mouth, fall down in other places, without kindling or forming new craters.

Such outbreaks of cholera have often been called explosions, and are also comparable to loaded mines, seeing that they can indeed be made to flare up by means of human intercourse, by persons coming from cholera districts, bringing with them a still glowing ember from there; but what, strictly speaking, makes a locality a cholera locality, is no more brought there by human intercourse, than the power of gunpowder is located in a piece of touch-wood. The burning touch-wood in a gun without powder is a perfectly harmless thing.

If we only learn the lesson from the catastrophe at Laufen, that the ravages which cholera causes, are much more dependent on the locality, than on the introduction of the cholera-germ, then the 83 prisoners who died out of 500, have not been sacrificed in vain. Science and practise will then soon take another direction, in which they will more quickly arrive at better and more definite results, than has hitherto been the case.

In India, the home of cholera, the view has recently been gaining ground, that the power of cholera is not dependent on intercourse, but on local and personal circumstances, upon which man has it in his power to exercise some influence. One of the most recent reports on cholera there, unlike previous ones, in which great stress was laid upon measures for isolation and disinfection, proves a very essential decrease of cholera cases in those very Indian prisons which were formerly the hot-bed of the disease. According to Cunningham's communications, 300 deaths from cholera occurred annually between 1860—7 among the prison-population of Upper India, comprising an average of 15000 souls, i. e. 20 per thousand; in the epidemics which have occurred there since 1867 not more than 162 have died annually out of an average prison-population of 17000, making 3 per thousand.

This decline, indeed a comparatively still greater one, has manifested itself also in the prisons of the Madras Presidency, where the cholera occurs still more frequently than in Northern India. According to the computations of Dr. Cornish the average number of deaths per annum from cholera among the

*) Report on the Cholera Epidemic of 1872 in Northern India, by J. M. Cunningham M. D. Surgeon Major, Sanitary Commissioner with the Government of India. Calcutta. 1873.

prison population of the Madras Presidency before 1867 was 23 per thousand, since 1867 it has been $1\frac{1}{2}$ per thousand.

Since 1867 not only have sanitary improvements of various kinds been carried out in the Indian prisons, but movement i. e. the abandonment of the infected spot has also taken the place of the quarantine, isolation and disinfection system on the outbreak of cholera.

The same principle is now also practically introduced into the Indian army, so far as military exigencies allow it, and even here a material improvement is making itself perceptible. In building barracks, not only is the place chosen with a view to the greatest possible immunity from cholera, but a place, a station, is also fixed upon beforehand for every garrison, to which they can remove on the breaking out of cholera, in which migrations even the patients are taken with them as a rule. It is seldom, that a great number of cases of cholera continue to occur among troops who have moved off at the right time.

It is not my present task, to discuss preventive measures, but I have one or two matters to communicate, relative to the history of the cholera in the town of Laufen, in order to entirely fulfil my immediate task, the investigation of the outbreak of cholera in the prison.

SUPPLEMENTARY HISTORY OF CHOLERA IN THE TOWN OF LAUFEN AND ITS ENVIRONS.

The representation of the outbreak of cholera in the prison at Laufen would not be complete, if I left unmentioned its liability to cholera in former years, and especially those events having a relation to cholera which preceded the outbreak; they seem to me indeed to be of capital importance from an etiological point of view.

The first epidemic which visited Bavaria in the year 1836, left Laufen and its immediate neighbourhood quite unaffected; the nearest cholera district to Laufen at that time was Oltötting and Neuötting on the Inn, where 14 attacks and 8 deaths occurred among about 3200 inhabitants.

In the year 1854, in which Munich and numerous places in Upper Bavaria had epidemics of cholera, one sporadic case of cholera occurred in Laufen on Aug. 24th, which terminated fatally, but gave rise to no further cases. — No other cases appeared at that time in the district. Neuötting on the Inn was again the nearest cholera district, where 43 attacks and 24 deaths from cholera occurred in a very sharply defined part of the town between Nov. 5th 1854 and Jan. 10th 1855. The cholera seasons in Oetting seem to differ regularly from those in Munich.

The cases of cholera in Oetting in 1836 happened between Aug. 22nd and Sept. 29th, were therefore materially in advance of the epidemic in Munich, which did not begin there till November, and reached its height in December: on the contrary it was the reverse in 1854, then Munich had an epidemic, which reached its culminating point at the end of August and then declined, so that it was already pronounced to be extinct in November, when the cholera first began in Oetting.

The prison at Laufen has existed as such since the year 1863. The year of war, 1866, which counted numerous and violent epidemics of Cholera in Austria, in North Germany, on the Rhine, and in Belgium, left the whole Swabian and Bavarian table-land on the right of the Danube entirely free from cholera, in spite of active intercourse with the theatre of the war through the medium of the hospitals for

[continuation of the text at p. 102.]

LIST OF THE CASES OF CHOLERA

which occurred at Salzburg between August 15th 1870 and October 25th 1873.

(20,336 inhabitants — 1,012 inhabited houses at the last census.)

No.	1	2	3	4	5	6	7	8	9	10	11	
PLACE	DWELLING (Street, No. of house, Story)	No. of inhabitants in affected house	Whether the patient came from any other place, and if so, when	SURNAME	SEX	AGE	POSITION OR TRADE	Day of Attack	Day of Death	REMARKS		
					of the patient							
					male	female	age					
1	Salzburg	„Oester. Hof“ Hotel	—	arrived from Vienna, Aug. 14	Böhm	m.	—	40	Baker, mar- ried	Aug. 13	Aug. 17	363 Getreide-Gasse, so- called Kronhaus, a building crowded with elderly reduced indi- viduals. Large pig-sty belonging to butcher Steil. 2 large cess-pools wooden privy-recep- tacles.
2	"	Hotel de l'Europe	—	arrived from Munich, Aug. 14	Bell	—	f.	55	Widow	Aug. 14	Aug. 16	
3	"	363 Getreide- Gasse 3rd floor	143	—	Henneberger	m.	—	56		Aug. 27	Aug. 27	
4	"	"	"	—	Weibhauser	m.	—	63	"	Aug. 28	Aug. 29	
5	"	"	"	—	Schmid	—	f.	77		Aug. 29	Aug. 29	The house stands in almost the lowest-lying part of the town, a few yards from the Salzach, the threshold of the building towards Gries- Gasse 1° 3' 0" above the level of the Salzach. The house has 3 stories, dwellings on both sides of the passages. Great want of cleanliness. Drinking-water from the town water-works.
6	"	"	"	—	Mauer- kirchner	—	f.	38	Maid-servant, single	Aug. 30	Aug. 30	
7	"	44 Gold-Gasse	36	—	Henneberger	—	f.	48	single	Aug. 27	Aug. 30	
8	"	Maxplan „Rabenbauer“	—	came from Max- plan, Sept. 3	Glück	m.	—	24	Servant, single	Sept. 3	—	
9	"	Linzer-Gasse „Mondschein“	23	—	Gmachl	m.	—	32	Butcher, single	Sept. 3	—	Discharged cured Sept. 12th. Employed by scavenger, who also empties the cess-pools in the hospital.
10	"	363 Getreide- Gasse 3rd floor	143	—	Frauenlob	m.	—	63		Sept. 3	Sept. 6	
11	"	Linzer-Gasse „Gablerbräu“	—	arrived from Vienna, Sept. 3	Lauer	m.	—	53	Manufacturer married	Sept. 3	Sept. 4	Discharged cured Sept. 11th.
12	"	31 Müllner- Haupt-Strasse	5	—	Schnell	—	f.	42	Cook, single	Sept. 7	—	
13	"	140 Kai-Gasse 3rd floor	42	—	Gatterer	m.	—	55	Servant, single	Sept. 18	—	Discharged cured Oct. 19th.
14	"	Hagenau near Bergheim	—	came from Hagenau, Sept. 19	Merks	m.	—	28	Hodman at water-works, single	Sept. 19	Sept. 24	
15	"	Linz „Traube“	—	came from Linzer-Gasse Sept. 22	Somonini	m.	—	66	Green-grocer, married	Sept. 22	—	Discharged cured Sept. 30th.
16	"	Geigl near Salzburg	—	came from Geigl	Korn	m.	—	36	Miller's man, single	Sept. 25	—	Discharged cured Oct. 7th.

[Continuation,]

LIST OF THE CASES OF CHOLERA

which occurred at Salzburg between August 15th 1870 and October 25th 1873.

(20,336 inhabitants — 1,012 inhabited houses at the last census.)

No.	1	2	3	4	5	6	7	8	9	10	11
PLACE	DWELLING (Street, No. of house, Story)	No. of inhabitants in affected house	Whether the patient came from any other place, and if so, when	SURNAME	SEX	AGE	POSITION OR TRADE	Day of Attack	Day of Death	REMARKS	
											of the patient
				male	female	age					
17	Salzburg	Glasenbach	—	came from Glasenbach	Hofer	—	f. 62	Widow of water-man	Oct. 9	Oct. 10	
18	"	129 Kai-Gasse Frohnveste	98?	—	Walter	—	f. 28	Maid-servant, single	Oct. 14	—	Discharged cured Oct. 25th.
19	"	35 Gold-Gasse	75	—	Müller	m. —	24	Brick-maker, single	Oct. 14	—	Discharged cured Oct. 20th. Cess-pool, but- cher Daghofer's slaugh- ter-house.

LIST OF THE CASES OF CHOLERA

which occurred in Salzburg from February 1st 1874 to March 8th 1874.

1	Salzburg	St. Rott	—	arrived from the Rott (Bav. frontier) Feb. 2	Reuer	—	f.	31	Working- woman, single	Feb. 1	Feb. 4	In the 9th month of pregnancy
2	"	St. John's Hospital, 2nd floor	about 200	—	Grünwald	—	f.	69	Single	" 6	" 7	Had been in the medi- cal department for muscular rheumatism since Jan. 31st, and lay next the woman Reuer who had cholera.
3	"	"	"	—	Holzer	—	f.	65	Maid-servant, single	" 12	" 13	Had been in the medi- cal department since Nov. 10th with heart- disease and hemiplegia, was in the same room as the two preceding patients, but on the opposite side.
4	"	"	"	—	Koberger	—	f.	8	Foundling	" 12	—	Discharged cured March 6th, had been in the medical department since Feb. 6th for gastric catarrh and was placed in another room.
5	"	43 Stein-Gasse	"	—	Kraus	m.	—	32	Painter, single	" 9	—	Discharged cured Feb. 14th.
6	"	30 Stein-Gasse	"	—	Oberhuber	—	f.	48	Wife of painter	" 9	—	Discharged cured March 7th. The house has a drain which opens into the main-drain in Stein- Gasse, the latter dis- charges its contents into the Gersbach. A porter out of the same house died of cholera at Reichenhall on Feb. 23rd.
7	"	Rainberg	6	—	Schwab	m.	—	32	Waggoner, single	" 21	Feb. 23	Wooden shed, stable for 6 horses, in which patient also slept. Cess-pool.
8	"	St. John's Hospital, 2nd floor	"	—	Weber	m.	—	60	Bricklayer, single	" 23	" 24	Had been in the medi- cal department since Jan. 26th for cardiac disease, slept in a bed adjoining that of the attendant.
9	"	Ditto, ground- floor	"	—	Fischwenger	—	f.	45	Laundress, single	" 26	—	Discharged cured March 15th.

the sick and wounded established in Munich and other places. The adjacent part of Austria, to which Salzburg and the places on the right bank of the Salzach lower down the stream belong, enjoyed the same immunity at that time. — Salzburg must besides be enumerated among those towns, which have hitherto shown themselves exempt from cholera, which is remarkable considering the active intercourse kept up with it by strangers and the circumstance, that the town is frequently sought out just at cholera seasons by persons flying from cholera, some of whom are always attacked in their place of refuge, but invariably without causing an epidemic. Salzburg has also no inconsiderable garrison, and the circumstances connected therewith are likewise considered well calculated to introduce and disseminate cholera in a place.

Salzburg was however in great danger of losing its reputation for constant immunity during the recent epidemic, and that on two occasions, the first time in August 1873, the other time in February 1874. From Aug. 13th to Oct. 14th 1873 there occurred 19 cases of cholera in Salzburg, only 8 of which were introduced from without, 11 of which therefore had arisen in the town itself, most of them (5) in a poor quarter. Between Feb. 1st to Oct. 14th 1874 the disease again elevated its head and caused 9 attacks, a single one of which may be classed with imported cases. On this occasion several patients of St. John's Hospital (1 male and 5 females) were attacked. It is believed that the first patient had brought the cholera with her from without.

The tables kindly sent me by Dr. Minnigerode are given in the two preceding pages.

On both occasions when traces of cholera appeared in Salzburg, they were also remarked in the neighbouring watering-place Reichenhall, where some cases in August produced great alarm among the visitors. But no epidemic propagation resulted either in Salzburg or in Reichenhall in this year, so that the immunity of both towns remains not only unshaken, but has been verified anew.

Strange to say the district in the valley of the Inn in the immediate vicinity of Laufen, Altötting and Neuötting, which had shown signs of epidemic dissemination in each of the two preceding cholera periods, did not manifest any susceptibility for cholera in this recent cholera period, although a railway from Munich to Oetting had arisen in the meantime since 1854, and several of the prisoners discharged from the prison at Laufen during the epidemic had passed through these two places. The germ was undoubtedly brought to Oetting through the active intercourse with Munich and Vienna both during the summer and winter epidemics, but seems to have found no place this time for its further development.

In the same manner however the town of Laufen and the district presented the very opposite state of things in 1873 to that which obtained in the years 1836 and 1854. Two house epidemics occurred in two villages of the district, in Gerspöint and Surrheim, on the road along the left bank of the Salzach between Salzburg and Laufen, between Sept. 26th and Oct. 11th, occasioning 5 deaths from cholera in Gerspöint, and 3 in Surrheim, without local epidemics being developed.

The same thing happened in Oberndorf (Austrian Laufen) on the other bank of the Salzach, where 3 cases of cholera occurred in one house (Billerhardt the tanner) in the beginning of October, 2 of which ended fatally, without the malady being disseminated any further there either.

Several suspicious cases of diarrhoea occurred at the same time in the parish of Salzburghofen. (I derive these facts from the reports of Dr. Loder and Dr. Berr of Laufen, and Dr. Rosner of Oedhof.) —

What however deserves the greatest attention in deciding on the etiology of the prison epidemic, is the fact, that pretty much at the same time, (only about a week earlier), as the house-epidemics appeared at Gerspöint, Surrheim and Oberndorf, the same thing happened in a number of houses in the two suburbs of Laufen, viz, Obslaufen and Villern. Ten cases of cholera occurred there between Sept. 16th and Oct. 8th, and 1 case of choleraic diarrhoea at Meyerhofen, 8 of which cases ended fatally. Dr. Berr has also minutely investigated and described this little local epidemic, having himself treated almost all the cases. An introduction of the malady from without through the medium of patients could not be detected in spite of all the researches. The investigations as to there being any personal connexion between this little epidemic

in the suburb and the subsequent great epidemic in the prison in December turned out equally unsuccessful. What, however, the houses attacked at Obslaufen and Villern had in common with the prison, is their local situation. (See plan of the place.)

The Salzburg road runs parallel with the river near a slight eminence, passes through the places Villern and Obslaufen, dividing them into a more elevated portion towards the west, and a more low-lying portion declining towards the Salzach on the east. The cholera in Villern and Obslaufen appeared only in houses on the eastern slope between the road and the river. The difference in height between the road and the river, according to measurements made in several places, amounts to between 9 and 14 metres. Three houses and an adjoining house in Villern were affected with cholera, and 3 houses also in Obslaufen. The affected houses were everywhere close to each other.

The prison at Laufen is also placed on this eastern declivity, with this single difference in situation, that a protecting wall, — 14 metres high from the level of the river to that of the road, — rises up on the spot where the prison stands, and the slope between the base of this wall and the road is artificially filled up, so that the prison seems to be placed on a level plain bounded by a perpendicular wall rising up from the margin of the river, whilst the houses in the suburb stand on a steep decline. If the parts of Obslaufen and Villern, where these cholera-houses are situated, had protecting walls reaching up to the level of the road, and if the intervening ground were filled up there also, their situation would appear quite identical with that of the prison.

These 10 cases of cholera and deaths in the suburb of Laufen among cottagers, boatmen and poor people, and their remarkable local limitation have certainly the same etiological significance as the 125 cases of cholera and 83 deaths in the prison. The affected houses comprised 40 inhabitants altogether. Consequently 25 per cent of these were attacked and 20 per cent died of cholera, while 24 per cent of the 522 prisoners were attacked and 16 per cent died of cholera.

The cholera which affected these houses in Obslaufen and Villern towards the end of September and in the beginning of October, invaded their immediate neighbourhood and the town itself just as little as the epidemic in the prison in December had done, and the only essential difference between these 3 different parts of Laufen attacked by cholera is in the time of the outbreak of the malady. The course of the malady was equally rapid everywhere, these house-epidemics were everywhere extinct in a remarkably short time, which was also the case with the house-epidemics at Gerspöint and Surrheim, as well as with those at Salzburg.

The outbreak of cholera in the prison presents therefore no specific difference from the other outbreaks in Laufen and its environs, it has only caused much more sensation than the other local explosions, and is far better adapted for etiological study than the former.

The Cholera Commission of the German Empire could not therefore neglect anything that might contribute to put it in possession of all the facts in the most comprehensive form. Such an unusually violent outbreak of cholera in a large building, inhabited by such a number of men, living in almost exactly the same circumstances, is, as the history of cholera teaches, a very rare event in Europe, that will not soon recur. The commission were therefore certainly justified in every respect in betaking themselves to the place itself, and claiming the co-operation of public bodies and persons in the attainment of their object, which also was always willingly afforded them.

At the request of the Imperial Chancellor and the Cholera Commission, I now publish these facts, without first drawing any definite conclusions from them, which I had better postpone, till I have also discussed the occurrence of cholera in three other Bavarian prisons, in the penal work-house at Rebdorf, and in the prisons at Wasserburg and Lichtenau.

The case at Laufen seems to me to take rank as a typical case, it is a true classical example, a cabinet-piece for the study of the etiology of cholera, and during my long labour a feeling often consoled

me akin to that which palæontologists may here and there experience, when after having found individual parts of some interesting antediluvian animal in different places, here in one stratum a vertebra or pelvic bone, then again elsewhere a scapula or a foot, again somewhere else a tolerably well-preserved skull-bone, they suddenly find a large and complete skeleton, may be, lying also in a corner of the earth unknown and remote as the little town of Laufen, or in a stratum, as despicable, as the stratum of human society, which is deposited in a prison. My next task will be to extricate the skeleton with the greatest possible care, without breaking much, erect it in its anatomical nakedness, and replace none of the still absent pieces by my fancy.

How far I have succeeded, let professionalists decide, whom I here urgently invite to the study of the object.

METEOROLOGICAL REMARKS.

I have introduced this subject with some notes on the course of the cholera in Munich, and appended a chart, drawn up partly by Dr. Port, partly by Dr. Wolffhügel, and on which, besides the numerical frequency of cholera, there is also to be seen the movement of the ground-water in Munich, the temperature and pressure of the air, as well as the amount of atmospheric deposit on every day from June 1873 to May 1874. The influence of the seasons on the occurrence of cholera is a fact at least as certainly demonstrated in India, the home of cholera, as well as in extra-Indian districts and with us in Europe, as the influence of communication. As however the idea of season is of a somewhat complex character, it is necessary to examine in what the observed influence actually consists. It is customary to regard the temperature of the air as the influential principle, because epidemics are most frequent and violent in summer and autumn. The course of the last cholera epidemic in Munich and Laufen has sufficiently shown, however, that there are very important exceptions to this rule. We cannot then look for any special progress in our knowledge of causes, if we rely solely on this agency, the temperature, and are obliged therefore to take other agencies into the circle of our considerations.

I will certainly not anticipate considerations and conclusions from another quarter, but only incite thereto, when I confess here, that the undisputed influence of the seasons on the frequency of cholera in and out of India seems to me to depend principally upon the effect of atmospheric deposits upon the soil, especially upon the amount of water and humidity in different strata, which is most distinctly evidenced in some specially favourable places by the height and movement of the ground-water. In some places this influence, especially as regards typhoid fever, the mode of dissemination of which has much resemblance to that of cholera, has been already demonstrated in such a manner and during such a period, that it is much more probable than most of the formerly accepted causes of such-like disease, and that there is certainly no longer any danger in turning back, if we would make further researches in this direction.

For this reason the movement of the ground-water, as observed in three different parts of Munich, is found represented directly under the numerical frequency of cholera in the above-mentioned chart of Munich, one part (Physiological Institute) situated in the south, the other (Oberwiesenfeld) in the west, and the third (Polytechnicum) in the north of the town on the left bank of the river. In the first place the observations were made daily by me or my assistants, in the second place by Staff-surgeon Dr. Port at intervals of a few days, and in the third place a self-registering water-mark has been contrived by Dr. von Bauernfeind, the director, the watch-work of which marks the height of the ground-water every two

hours, the daily mean being deduced from these observations. This apparatus was under repair for some time on account of a broken chain, hence the interruption to be seen in the curve.

It would certainly be of great interest now, to represent the same meteorological dates and the height of the ground-water in Laufen also, — but the needful machinery is wanting for this purpose, there exists no meteorological station in Laufen, the observations at which could betoken the rhythm of atmospheric appearances for a somewhat long period, nor are observations of the ground-water made there. The ground-water in Laufen is not at all adapted for the latter, as its level assimilates too much that of the river, and its height is too much influenced by the damming up action of the river. In Laufen therefore, as in many other places, the sole criterion for determining the changes in the humidity of the ground, which are so distinctly expressed in Munich by the level of the wells lying above the damming up influence of the Isar, are the varying amounts of atmospheric deposit.

It is a fact well known to all meteorologists, that the amount of rain-fall increases in the same latitude as we approach a high mountain, and for this reason it may be assumed that the amount of rain in Laufen will be somewhat larger than in Munich, in proportion as the former is nearer to the Alps than the latter. Dr. Rudolf Spängler, who keeps a chemist's shop in Salzburg, and who has gained some merit as a hygienist in his native town, was so kind as to inform me of the amount of rain, and the height of the river and ground-water in Salzburg, inclosing also a treatise by Fritsch on the periodicity of the water-level of the Salzach.

An approximate calculation for Laufen can be made by comparing the amount of rain-fall in Munich and Salzburg: Munich exhibits 357.15 Paris lines = 803 millimetres of rain, as the mean of 17 years' observation, Salzburg 492.89 Paris lines = 1109 millimetres in the year as the mean of 14 years' observation, consequently about 38 per cent more than Munich. Laufen may perhaps have 15 to 20 per cent more rain-fall on an average than Munich.

I had however an opportunity only a short time ago of convincing myself most positively that it is impracticable to assume the amounts of rain-fall to be essentially equal even in places lying near each other and equally distant from the mountains, or for example to deduce the rain-fall at Laufen from that at Salzburg or Munich. Munich is situated in the valley of the Isar at the same distance from the mountains, as Augsburg in the valley of the Lech, and both cities are not 42 English miles distant from each other in a straight line. The average rain-fall at Munich and Augsburg does not essentially differ, when extended over long periods of time, but such great differences obtain in individual years and seasons, as I had not expected.

The proof thereof can be taken from the following table, in which the amounts of rain observed at the two meteorological stations are compared.

Monthly Rainfall in Millimetres*) in

	Munich	Augsburg
January 1873 . . .	6.7	21.7
February	51.0	123.6
March	32.6	107.1
April	53.8	97.0
May	122.5	129.2
June	132.1	169.4
July	74.9	94.0
August	171.9	50.6
September	66.0	64.2
October	50.8	78.3
November	32.5	100.6
December	11.9	23.9
January 1874 . . .	14.6	60.2
February	22.4	56.5
March	28.4	85.6
April	71.8	76.3
May	145.5	117.5

*) Remark. In order to convert millimetres into Paris lines, divide the number of millimetres by 2.25.

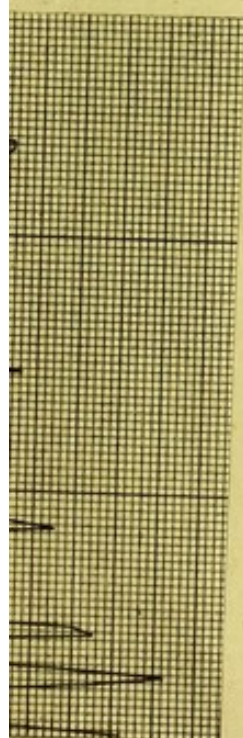
Augsburg had therefore 31 per cent more rainfall than Munich in the year 1873, consequently bore exactly the same relation to Munich this year as Salzburg does on an average.

I am very much inclined to assume, that the remarkable and constant immunity from cholera of towns, like Salzburg and Insbruck, which are situated in the valleys of rivers on common alluvial soil, but among mountains, as Munich is situated on the table-land lying in front of the mountains, is solely due to the state of the ground-water and the amount of rain-fall, from which all the ground-water proceeds. The soil of Munich does not differ materially from that of Salzburg, with the exception of individual parts of the latter town, which stand on solid rock, Salzach pebbles and Isar pebbles being very similar; on the contrary the amount of rain-fall at Munich is very different from that at Salzburg.

The immunity of Augsburg in the year 1873 in contrast to the epidemic at Munich, and the violent epidemic at Augsburg in the year 1854, simultaneous with that at Munich, seem also to me much more naturally explained by the different amounts of rain-fall in the two places and in the two years, than by any difference in the measures resorted to in both towns. The people of Augsburg congratulated themselves, it is true, upon having saved the town; it often happens that men ascribe to themselves as a merit, what heaven has done for them. I shall speak more fully in another place of the immunity of Augsburg in the year 1873.

This temporary agent seems to me to have been not less the cause, why the cholera which began to germinate at Munich in August, was suddenly arrested in its development, and declined till it became extinct, to break out again in the cold season only after long-continued drought, and to last until the spring of 1874.

I only mention here these relations of Munich and Augsburg, to which I shall revert more at length on another occasion, and have also added this appendix on the defective meteorology of Laufen, only to draw the attention of all professional men to the fact that in future the medico-etiological investigation of certain epidemics can no longer make progress, without taking meteorological influences into consideration; but that the amount of rain-fall, and at the same time the nature of the soil and climate, must be examined more attentively and exactly, than has hitherto been the case. I find myself, as regards this view, in harmony with the conclusions of the recent international sanitary conference at Vienna, which unanimously accepted a motion to this effect.



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GROUND-PLAN.

The plan shows the layout of the Fort of Mauthausen, including the Main Building, Chapel, Hospital, Barracks, Tower, and various courtyards. It also shows the location of the Salzach River, canals, and a ditch called Schiessgraben. A compass rose indicates North, South, East, and West. A scale bar at the bottom is marked in Bavarian feet.

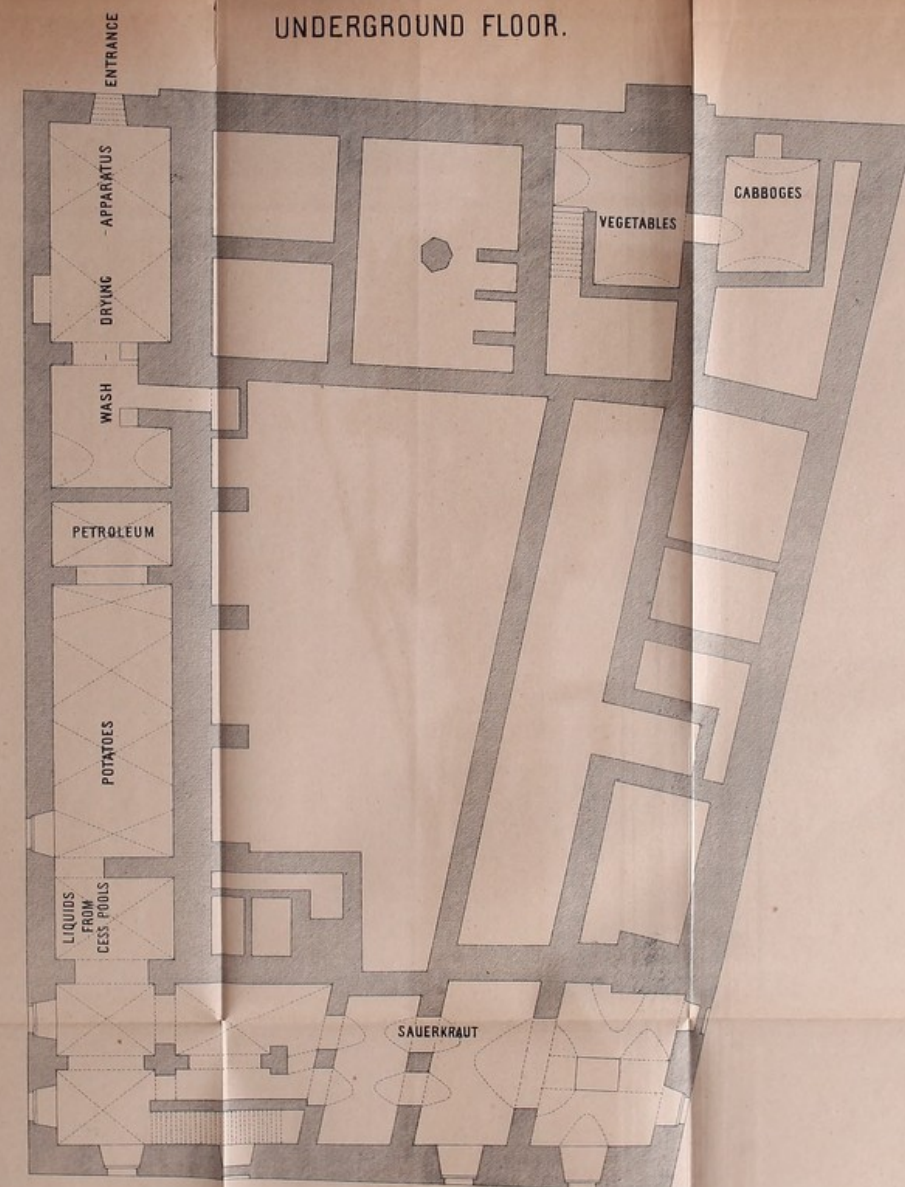
Labels on the plan include: SALZACH-RIVER, CANAL, CLOSETS-CESS-POOLS, CELLS, MAIN BUILDING, CHAPEL, CORRIDOR, HOSPITAL, MUD RESERVOIR, WELL, COURT-YARD, HOSPITAL, MUD RESERVOIR, CLOSETS-CESS-POOLS, JNNER COURT-YARD, PRIVATE HOUSES, TAUBEN LAKE, CLOSETS-CESS-POOLS, SMITH, HELLMINGER, LOCKSMITH, SCHULZ, BARRACKS, DIRECTION HOUSE, ENTRANCE, TOWER, DITCH CALLED SCHIESSGRABEN, GARDEN, WELL, EAST, NORTH, WEST, SOUTH, CUSTOM HOUSE, and a scale bar in BAVARIAN FEET.



PRISON
AT
LAUFEN
MAIN BUILDING.

UNDERGROUND FLOOR.

Plan II.



10 20 30 40 50 60 70 80 90 100 110 BAVARIAN FEET

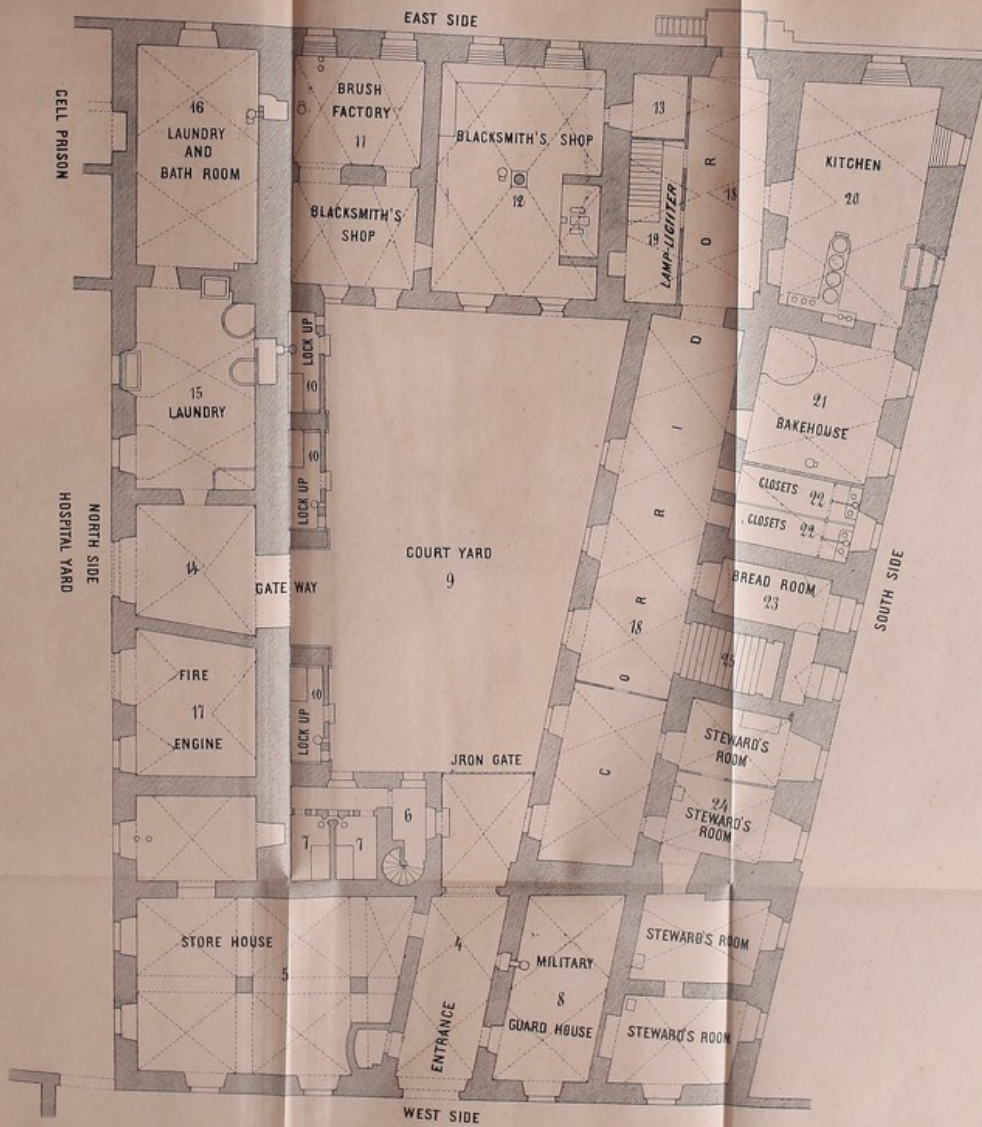
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PRISON
AT
LAUFEN
MAIN BUILDING.

GROUND PLAN
OF THE GROUND-FLOOR.

Plan III



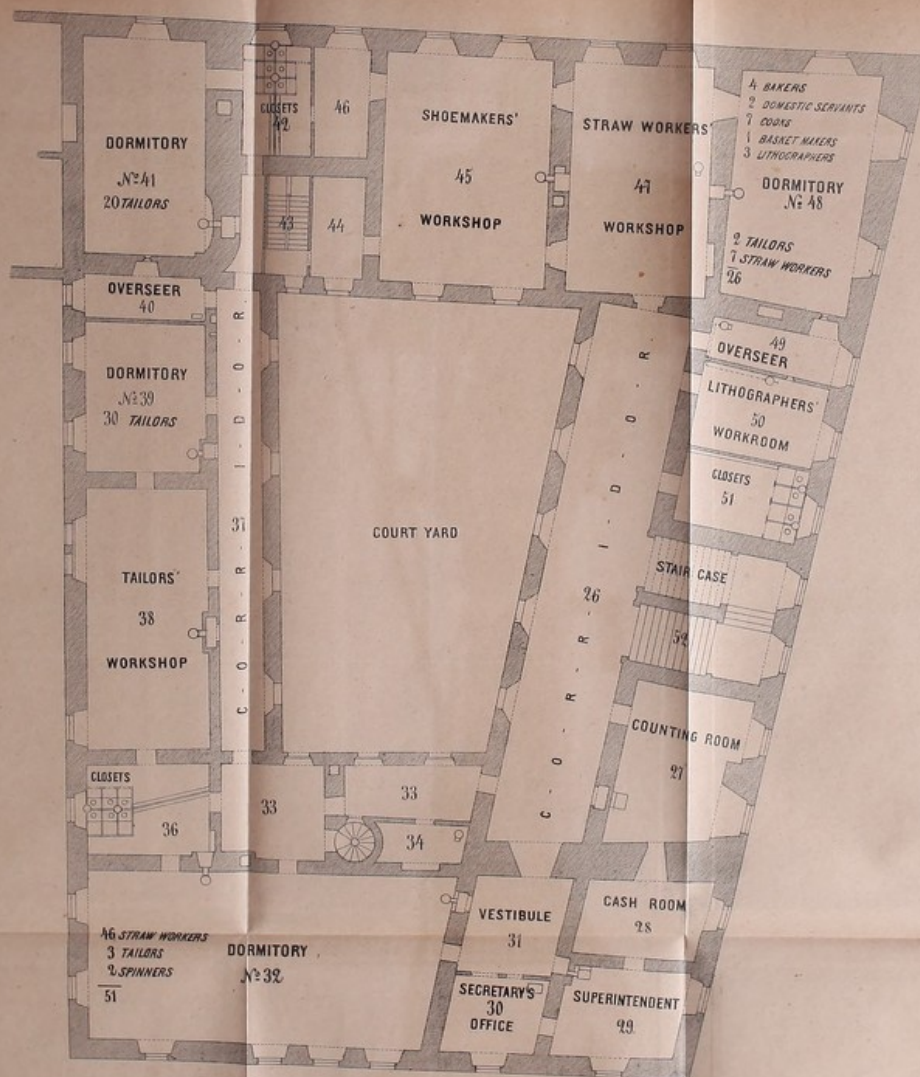
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PRISON
AT
LAUFEN
MAIN BUILDING.

GROUND PLAN OF THE 1ST. FLOOR.

Plan IV.

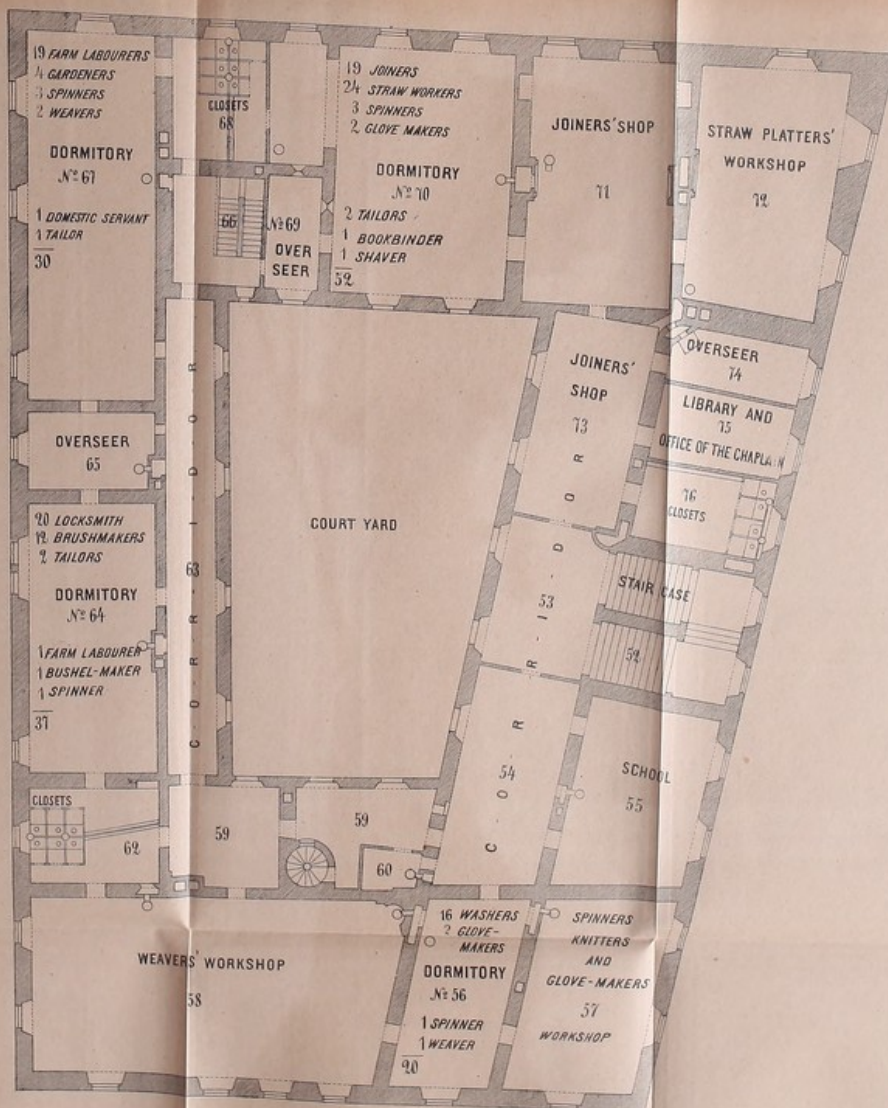


Ed. by J. H. Müller, Laufen.



PRISON
AT
LAUFEN
MAIN BUILDING.

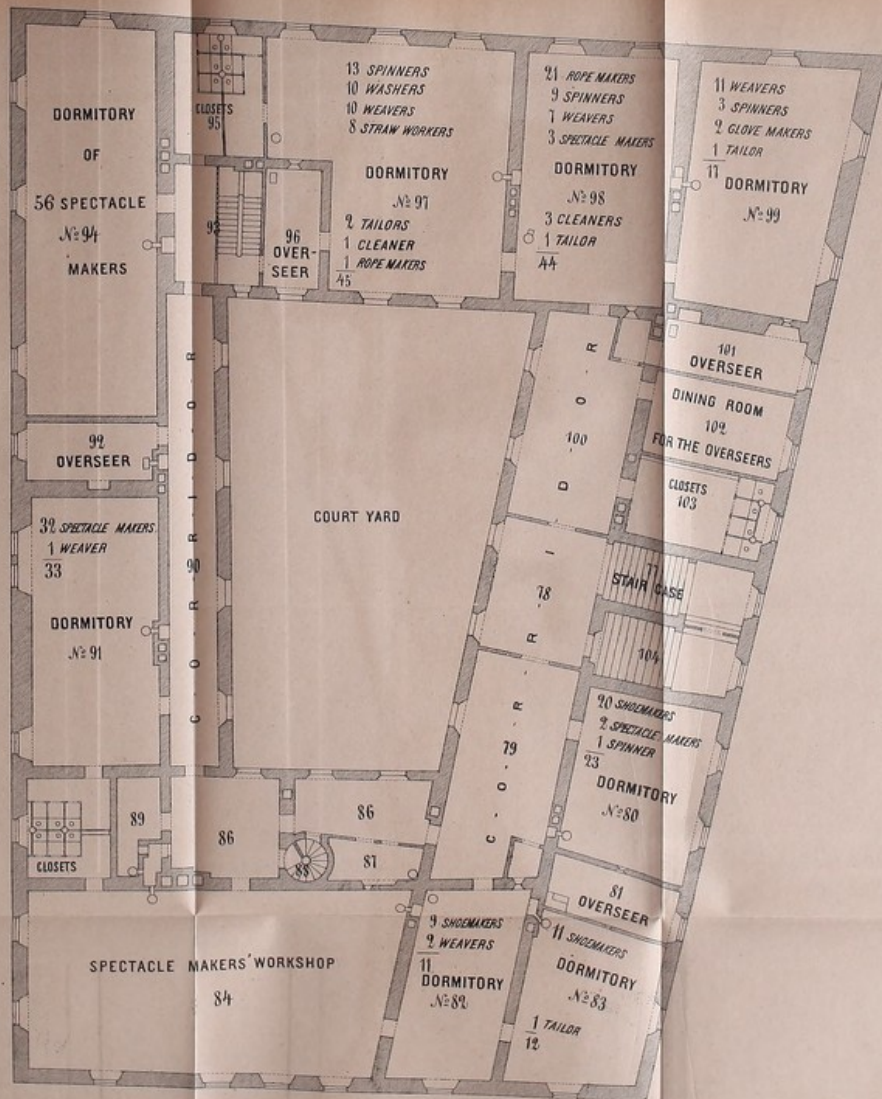
PLAN OF 2ND FLOOR.





GROUND PLAN OF THE 3RD. FLOOR.

PRISON
AT
LAUFEN
MAIN BUILDING.





MAP OF THE TOWN

of

LAUFEN

- HOUSES INFECTED WITH CHOLERA, BLACK
- HOUSES OF OFFICIALS & OVERSEERS, RED.

SOUTH
NORTH

MAYERHOFEN

ROAD FROM SALZBURG TO LAUFEN

SUBURB
VILLERN

RIVER SALZACH

SUBURB
ABRAIN

PLAQUE-HOUSE
SUBURB
OBSLAUFEN

PRISON

ENSMANN

AUSTRIAN TERRITORY

BILLERHARD'S TANNERY
SUBURB
OBERNDORF

engraved by J. H. M. M.

