

desire the truth strangled, and having reconsidered his air theories would whole-heartedly agree with Duncan. He thought that questions of discipline should not enter this matter. However, Dr. Hendley ruled any reference to the matter as out of order while he was present and we loyally accepted his decision. Later, when we had reached our homes and had had time to reflect, there was not a shadow of doubt that we had scalped the Surgeon-General.

A few days later the P.M.O. received a communication from Simla, which alarmed him, for he hinted at possible resignation. We also realized that something unpleasant would happen to us, as we heard that Sir Benjamin had taken serious umbrage at our conduct. However, he was a sportsman and a thoroughly good fellow and though naturally annoyed took no further notice. It was different with Duncan, who belonged to his service. He received a reprimand from his General. Deakin never survived. He was ordered to Bunnoo, a place he detested and where he was cramped in every direction. He became infected with enteric fever and died. I lost a great friend and I miss him to this day. He would have had a great future if he had been handled a little more tactfully in his earlier service. The shock eclipsed our little Service society, and only one committee meeting was held afterwards. It came about in this way. Many years afterwards I paid a visit to my old chief, Surgeon-Colonel J. P. H. Boileau, at Trowbridge, where he held a half-pay appointment. It will be remembered he was our treasurer. While I was with him we discussed the old days, and he told me that he had a few pounds belonging to the society in his possession. We formed a committee and as I was on the active list he put me in the chair. He read the minutes of the last meeting and proposed, and I seconded, that the balance should be forwarded to dear old Shirley's widow. He then formally completed the proceedings by writing to tell me that he had filed an acknowledgment of the gift.

*(To be continued).*

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## Current Literature.

EDWARDS, J. T. **Bovine Tuberculosis in India.** *Far Eastern Ass. Trop. Med. Trans. Seventh Congress, British India, 1927.* v. 3, 598-602. [Imperial Inst. of Vet. Research, Mukestar.]

"The general impression has been that tuberculosis is so rare in India, that it hardly merits attention." The writer of this paper, which is really an address given to the Seventh Congress of the Far Eastern Association of Tropical Medicine, sets out to investigate this statement.

The number of careful examinations made upon cattle in India for the detection of tuberculosis have not yet been many, but so far as they have gone they would seem to corroborate the general impression that bovine

tuberculosis is rare. A few years ago examinations of carcasses of slaughtered cattle at Ferozepore by TAYLOR and at Cawnpore by OLIVER revealed macroscopic lesions in approximately 3 per cent. of the animals. The lesions, were, however, invariably minute in extent, localized to the tissues in which they are most commonly found, and retrogressive in their appearance. A few cases had also been noted in Madras (among conservancy bullocks), in Bombay Presidency, and in Calcutta Jail. In 1923, however, W. SMITH declared from an experience extending over many years among military dairy cattle all over India, that he was unacquainted with the disease. In 1923-24 an enquiry made under the direction of the author's Department at Lahore and Ferozepore slaughter-houses, failed to discover lesions in carcasses subjected to an ordinary examination such as is commonly performed in meat inspection.

Laboratory examinations to determine the so-called types of tubercle bacilli found in various kinds of lesions in human tuberculosis in India have not yet been conducted upon a scale sufficient to warrant any conclusion as to the origin of infection, but at the Second Conference of Veterinary Officers in India held in 1923, HUTCHINSON made the important announcement that the incidence in the forms of tuberculous disease, a high proportion of which is known in Europe to be caused by bacilli of the bovine type, bears in India almost exactly the same numerical relationship to the other forms as has been calculated to exist in Europe. *A priori* this statement points to the presence of bovine infection in India, and would suggest that investigation is needed.

In 1923, therefore, the Indian Research Fund Association started an investigation on two questions: (1) Are Indian cattle more resistant to tuberculosis than are the cattle of European origin? Are the tubercle bacilli that give rise to the relatively mild tuberculosis occasionally detected among cattle in India of lower virulence than the bacilli isolated from the grave lesions of cattle in Europe?

Calves from the important breeds of cattle all over India, calves containing a considerable mixture of European blood (used as partial controls), and buffalo calves of various breeds were tested by subcutaneous inoculation of 50 milligrams of a young culture of a bovine virulent strain sent from Dr. Stanley GRIFFITH in England. There were no pure-bred European calves of the requisite age used in the test, and the results were, therefore, to some extent inconclusive. A large proportion of the calves succumbed to acute generalized infection within three months, in the same manner as calves in Europe are known to do; the buffalo calves proved as susceptible as the other calves. A considerable number of calves, however, displayed a high degree of resistance and recovered from the test; amongst these was a fair number of calves with a mixture of European blood [actual figures not given]. It might be concluded from the results of such an experiment that a noteworthy proportion of Indian cattle possess a hereditary resistance against tuberculosis which distinctly surpasses that observed in

European cattle. Strains of tubercle bacilli isolated by Dr. SOPARKAR from the restricted lesions observed in Indian cattle, proved, however, after appropriate animal inoculation, to be fully as virulent as control strains of highly virulent bovine bacilli obtained from Europe. The results were communicated by Dr. SOPARKAR in another paper at the meeting.

There would seem to be good reason, therefore, to believe that the low natural incidence of bovine tuberculosis in India is to be found in the open-air life of the cattle, which remain out of doors throughout their lives and, therefore, escape the massed infection of housed cattle which takes place in Europe. There is, indeed, further evidence to believe that when cattle in India are housed under conditions simulating those of Europe, a high incidence of clinical tuberculosis may develop in the herd after introduction of infection (Quetta military dairy). The existing infection among indigenous cattle as disclosed by the laboratory tests would appear to be no less virulent than that of Europe; its dissemination among animals would thus take place, after avoidance from carriers, in circumstances which would render infection operative only through the medium of minimal doses, probably frequently repeated, so that the existence of a preceding infection within the tissues would set up a vaccinating effect against each succeeding dose of virulent material. There is now further information which lends considerable support to this hypothesis, and, moreover, makes it necessary to recast some of our former impressions concerning the relatively low incidence of natural bovine tuberculosis in India and the mechanism of resistance among some cattle in the country towards artificial infection. In the course of very searching examinations carried out by Dr. SOPARKAR last cold weather at the Lahore and Ferozepore slaughterhouses, he found macroscopic evidence of tuberculosis in over 15 per cent. of the carcasses of cattle. In nearly all these cases the tuberculous nature of the lesions could be confirmed by detection of the bacilli or histological examination.

The presence of reactors to the tuberculin test which show no lesions upon slaughter, and the presence also of obscure lesions in carcasses in which a diagnosis of tuberculosis would most likely be missed by a man who was not highly expert at the work of detection, would suggest that the ordinary subcutaneous tuberculin test, as applied to Indian cattle, may be unreliable. The intra-palpebral test and the double intradermal test have now been substituted for the old subcutaneous test. The author has not yet encountered any cases of macroscopic affection of the udder with tuberculosis.

Among other work already accomplished in the course of this enquiry is the search for tuberculosis in other species of animals in India—horses, swine, camels, elephants. The author has reason to believe that horses are affected with both bovine and avian types of bacilli. Swine have been found by Dr. SOPARKAR to be affected, in the few cases he has examined from Bombay, with the human type pre-eminently, but also with the bovine

type. He has found an example of mixed bovine and avian infection in cattle and of a cervical tuberculosis caused by the avian type of bacillus in man.

S. ROODHOUSE GLOYNE.

*Reprinted from "Bulletin of Hygiene," Vol. 5, No. 7.*

KNORR, M. Typhus und Trinkwasser. (Eine epidemiologische Studie ueber die Pforzheimer Typhusepidemie 1919. [**Epidemiological Study of Water-borne Typhoid.**] *Arch. f. Hyg. u. Bakt.* 1929, v. 102, 10-36, 6 figs. & 5 plans. [28 refs.] [Hyg. Inst., Univ., Munich.]

An inductive study of the serious epidemic of typhoid in Pforzheim, in 1919, which was responsible for more than 2,000 cases. It is first shown that the regional distribution of the cases was too uneven to be likely to have arisen by chance and that the distribution corresponded to that of different water supplies. It is next shown that the distribution in greater or less dilution of a particular supply corresponded with the greater or less incidence of typhoid. Finally it is shown that the impugned source was liable to specific contamination from a cottage in which a case of typhoid had occurred and that the time relations of the epidemic were consistent with this origin (the study was simplified by the fact that the epidemic began in winter and that a relation with the point in time when a thaw occurred could be made out).

M. GREENWOOD.

*Reprinted from "Bulletin of Hygiene," Vol. 5, No. 8.*

CEREDI, A. La verdura nella epidemiologia della tifoide. [**Green Vegetables in the Epidemiology of Typhoid Fever.**] Reprinted from *Igiene Moderna*. 1929, v. 7, No. 1, 16 pp. [23 refs.] [Hyg. Inst., Univ., Bologna.]

Ceredi carried out experiments which confirmed the difficulty and even impossibility of disinfecting salad which had been contaminated by typhoid bacilli, either by subjecting it to prolonged washing in running water or by using those disinfectants which do not cause a change in the salad even in very high doses, viz., hypochlorites, chloramine, organic acids, etc. As regards the use of various disinfectants it should be noted that even with moderate doses which are sufficient to disinfect very impure water a certain effect may be obtained, but this effect does not become more pronounced in proportion to the increase in the dose.

Ceredi has been unable to find substances capable of increasing the action of the disinfectant. He tried, without success, salts, diluted acids and bases, and alcohol, and passage of the constant current through the solution in which the lettuce was placed. It was found that typhoid bacilli sprinkled over salad resist the natural agents of destruction for a period

not less than a fortnight. It cannot be denied, however, that their number becomes greatly reduced and that possibly under natural conditions the contamination is never so great as in experimental conditions. Owing to the impossibility, however, of completely disinfecting green vegetables, Ceredi recommends that measures should be taken to prevent green vegetables which have been contaminated by sewage being ever used for human consumption. [This subject has considerable interest for dwellers in the tropics and it is to be noted that this author's results are at variance with those obtained by MILLS, BARTLETT and KESSEL (this *Bulletin*, 1926, v. 1, 64) who found chlorine effective. It would have been interesting to have confirmation or otherwise of the finding of the same authors that dipping in boiling water for 10 seconds will "uniformly kill all pathogenic bacteria, protozoan cysts and helminth eggs which might be found contaminating such food products."—ED.]

J. D. ROLLESTON.

Reprinted from "*Bulletin of Hygiene*," Vol. 5, No. 8.

PIJPER, A. **Seriological Diagnosis of the Enterica.** *J. Hygiene.* 1930, v. 29, 380-93, 1 fig. [28 refs.]

The author records a series of cases of enteric infection, occurring in South Africa, which afford an excellent illustration of the importance of testing a patient's serum for O as well as for H agglutinins, as advocated by FELIX. (Certain of the protocols in this paper afford examples of the curious anomaly that the serum of a typhoid patient may give so-called 'O agglutination' with a suspension of *Bact. paratyphosum* A, while the serum of a patient infected with *Bact. paratyphosum* A may produce a similar result with a suspension of *Bact. typhosum*, although there appears to be no relationship between the main O antigens of these two bacterial species, as revealed by the work of Bruce WHITE and others.)

W. W. C. TOPLEY.

Reprinted from "*Bulletin of Hygiene*," Vol. 5, No. 8.

GARDNER, A. D., HOBSON, F. G., & STENHOUSE, G. **A Case of Typhoid Fever with Persistent Negative Widal Reaction but Positive "O" Agglutination.** *Lancet.* 1930. Jan. 25, 182.

The case here recorded is of interest as illustrating possible difficulties in the bacteriological diagnosis of typhoid fever, and the way in which they can be overcome by the application of recent advances in our knowledge of the antigenic structure, and variability, of the typhoid bacillus.

The patient presented the clinical syndrome of typhoid fever, but agglutination reactions carried out with standard formalized cultures were negative on the 17th and 23rd days of disease. A blood culture yielded a bacillus which had the characters of *Bact. typhosum* except that it was non-motile.

The specimen of serum obtained on the 23rd day was tested against two 'O' suspensions of *Bact. typhosum*—one an alcoholized suspension of a normal smooth strain, the other a formalized suspension of a non-motile 'O' variant—and in each case agglutination occurred to a titre of 1:125. Later tests gave confirmatory results. The non-motile bacillus, isolated from the patient's blood, was agglutinated to titre by an 'O' agglutinating serum. It showed no 'H' flocculation with an ordinary antityphoid serum, though it gave slow granular agglutination in the lower dilutions. From this non-motile strain, a motile variant was obtained which was fully agglutinable by an ordinary 'H' antiserum.

The patient was clearly infected with a strain of *Bact. typhosum* in the non-flagellated 'O' condition, and had therefore failed to produce the usual 'H' (flagellar) agglutinins.

W. W. C. TOPLEY.

*Reprinted from "Bulletin of Hygiene," Vol. 5, No. 8.*

GRASSL. Die vermutlichen Ursachen des Gebirgskropfes. [The Probable Causes of Goitre in Mountainous Districts.] *Muench. Med. Woch.*, 1929, v. 76, 1375-7. [4 refs.]

Two factors have a profound influence on the metabolic processes that occur in all animals, namely the amount of iodine in their food, and the amount of ultra-violet radiation they receive on their skin. Under the influence of ultra-violet radiations animals store up iodine in their thyroid glands and blood. It is not surprising therefore that seasonal variations in the iodine content of the thyroid should be the rule. The amount of available ultra-violet radiation is greater in mountainous districts than on the plains, and at the same time the amount of available iodine is often less. It is suggested that this discrepancy between excess of radiation and relative deficiency of iodine is responsible for the occurrence of goitre in mountainous districts.

S. J. COWELL.

*Reprinted from "Bulletin of Hygiene," Vol. 5, No. 8.*

STINER, O. Kropf- und Längenwachstum. [Goitre and Height.] *Schweiz. Med. Woch.* 1929, Nov. 2, 1102-4, 2 figs. [2 refs.] [Federal Health Office, Berne].

It is contended in some quarters that endemic goitre and short stature are intimately related to one another. Records of the height measurements of recruits of the Swiss army appear to support the view that the average height of Swiss males has been increasing steadily during the last 40 years. Thus, the average height of the recruits in the Canton of Berne during the years 1888 to 1890 was 162.9 cm., during 1908-1910, 165.2 cm., and during 1926 to 1927, 176.4 cm. In many other cantons a similar increase in stature has taken place. When the heights of individuals are correlated with their thyroid status, it is found that the average height of men with

diffuse or colloid goitres is in most cantons very appreciably greater than that of men with no goitre or with adenomatous goitres. In 24 out of the 30 districts in the Canton of Berne the recruits with colloid goitres were taller than those without goitres, and the mean difference in height between the two groups of men in one district was 3·2 cm. While no definite conclusions are drawn from these figures, it seems unlikely that the mere existence of an enlarged thyroid gland can be in any way responsible for shortness of stature.

S. J. COWELL.

Reprinted from "*Bulletin of Hygiene*," Vol. 5, No. 8.

MAZZOCCO, P. Investigaciones sobre el bocio endémico y su profilaxis. [Investigations into Endemic Goitre and its Prevention.] *Semana Méd.* 1930, v. 37, 356-73, 2 figs. & 7 graphs. [37 refs.] [Physiol. Inst., Faculty of Med. Sciences, & National Hyg. Dept., Buenos Aires.]

This article consists of a series of papers each recording the results of a separate study, but closely inter-related as throwing light on a complex subject. The work to which they refer was initiated by the National Health Department of Buenos Aires in 1924 and has been going on for the past six years. Briefly, the object aimed at was a determination of the iodine content of the air, water, soil, dew, and articles of food in Salta and Buenos Aires, for comparing the former in which goitre and cretinism are endemic, with the latter which are not so affected. After preliminary remarks on the physical geography of the Province of Salta comes a paper on the amount of iodine in the air, dew, soil and water, with a description of the apparatus and methods used for making the estimation. The results are expressed in microgrammes, i.e., thousandths of a mgm. (0·000,001 gm.). In the Capital Federal the amount was found to be 0·8 mmgm. per cubic metre of air, whereas in the air of Rosario de Lerma and Campo Quijano (goitrous districts) its presence could not be determined at all. In the dew of Capital Federal it was 3 mmgm. per sq. metre, whereas at the other places under similar conditions of collection none was found. In the soil of Buenos Aires the amount varied between 1,800 and 2,800 mmgm. per 1,000 gm. in different parts of the Province, whereas in Salta the figures were very low. In 18 districts the majority gave under 200 mmgm., the lowest being Tastil 140, and Rosario de Lerma 155 mmgm. and only one, Rosario de la Frontera, gave above 600 mmgm. Of 28 waters examined in the Province of Salta the lowest content was 0·3 mmgm. per litre, twenty-two were below unity and only one reached 2·5 mmgm. Of several samples in Capital Federal the lowest figure was 2·2 and the highest 6·2 mmgm., while in the Province of Buenos Aires the lowest was a well water at Banfield, analysis of which gave 8·3 mmgm., and the highest at Wilde 32 mmgm., per litre. A large number of foodstuffs are mentioned in another section comprising beef, cow's milk, eggs, grass pasturage, and

between twenty and thirty species of vegetables and twelve samples of cereals, and the results may be summed up by saying that the iodine content in areas where goitre was endemic was about half that in healthy, non-goitrous districts. A fourth paper details the analyses of many thyroid glands of sheep of various districts, results being presented in tables and in graphs. These may be epitomized by saying that in Buenos Aires the average was above 100 mgm. per 100 gm., whereas in Potrero de Linarea, La Caldera, Molinos (goitrous districts) the glands though enlarged contained a very low percentage, and in Cachi and La Cebada (also goitrous) even when the glands were not enlarged the relative content in iodine was small. The conclusion is that in the endemic areas administration of iodine, as by means of iodide salt, is justifiable as a prophylactic measure.

H. H. S.

Reprinted from "Bulletin of Hygiene," Vol. 5, No. 8.

GRIFFITH, A. S. **Types of Tubercle Bacilli in Human Tuberculosis.** *J. Path. & Bact.* 1929, v. 32, 813-40. [17 refs.] [Field Labs., Univ., Cambridge.]

In this paper the author brings up to date the results of the long series of investigations made by his colleagues of the Tuberculosis Commission and himself, on the types of tubercle bacilli. [See *J. Path. & Bact.*, 1928, v. 31, 875, for cases of human bone and joint tuberculosis.] The total number of cases investigated is given in a table in his summary of the article (see page 462).

In cervical gland tuberculosis the results of the investigation are summarized in a number of tables, and are classified as primary or secondary according to whether there was no clinical evidence of tuberculosis of the chest or of abdomen. In discussing the cases of tuberculous meningitis the author points out that in the great majority of the autopsies on meningitis cases, the oldest lesions were in the thorax, and in all but one of these thoracic cases the tuberculosis was caused by tubercle bacilli of the human type. In the remaining meningitis autopsies the distribution of the lesions pointed to the alimentary tract as the point of entry, and these cases were generally of the bovine type.

A series follows in which the writer gives the results of the examination of tuberculous material obtained at autopsies. Amongst these were 34 cases of primary abdominal tuberculosis from which tubercle bacilli were recovered in 16. In 6 of the 16 cases the primary lesions were in the intestines or the mesenteric glands. Four were infected with bovine, one eugonic human and one with dysgonic human bacilli. In none of these cases were the bronchial glands obviously tuberculous. In seven of the remaining cases, all of which were infected with eugonic human bacilli, the anatomical evidence was definitely in favour of the respiratory tract as the portal of entry of the bacilli. In one of the cases, entry by more than one route was indicated by the equally advanced caseation of the cervical,



mesenteric and bronchial glands. In the remaining two the anatomical evidence was inconclusive. Of the 18 cases of primary abdominal tuberculosis from which no tubercle bacilli were recovered in cultures there were lesions in the mesenteric glands, one or more of which contained calcareous, or calcareo-caseous substance.

In Table IX the author has classified into groups, according to the probable portal of entry of the tubercle bacilli, 171 autopsies on persons in whom macroscopic tuberculous lesions were found and bacilli of one type only were present.

A complete summary of bacteriological results in all the autopsy cases is also given. It comprises 319 autopsies. The cases fall into 3 groups: (1) 96 children in whom no macroscopic lesions of tuberculosis were discovered in any organ or gland; (2) 47 cases in which there were macroscopic lesions of tuberculosis, but living tubercle bacilli were not demonstrable in the tuberculous material investigated; (3) 176 cases in which there were lesions of tuberculosis and in which cultures of tubercle bacilli were obtained. The results of typing these strains and 7 strains from the first group are summarized in the second table.

Griffith also gives a miscellaneous group of cases including Addison's disease and others in which he obtained 21 human strains and two bovine out of a total of 23.

*English Statistics.*

Form of tuberculosis	Number of cases	0-4 years			5-14 years			14 years and over			Percentage bovine all ages
		H.	B.	B. %	H.	B.	B. %	H.	B.	B. %	
Cervical gland ..	116	3	18	85.7	28	26	48.1	32	9	21.9	45.7
Bone and joint ..	511	60	24	28.6	277	65	19.0	81	4	4.7	18.2
Urogenital ..	23	0	0	0.0	2	1	33.3	17	3	15.0	17.4
Meningeal ..	33	2	1	33.3	13	7	35.0	9	1	10.0	27.3
Autopsies ..	183	72	29	29.7*	48	7	14.3†	21	1	12.5‡	22.3
Miscellaneous ..	23	2	1	33.3	10	1	9.1	9	0	0.0	8.7

*Scotch Statistics.*

Cervical gland ..	17	1	3	75.0	3	7	70.0	1	2	66.6	70.6
Bone and joint ..	30	12	6	33.3	8	2	25.0	2	0	0.0	26.6

\* Including one of the two mixed viruses. † Including one mixed virus.

‡ Including two mixed viruses.

Finally he discusses a group of autopsies in which apparently negative tuberculous lesions failed to yield living tubercle bacilli in cultures or on guinea-pig inoculation.

A striking feature of these lesions was the presence in them of abundant well-formed tubercle bacilli. The author says: "It was at the first experience difficult to believe that these bacilli could have been dead, and the possibility was considered that they were attenuated forms, or living tubercle bacilli of another type, incapable of producing tuberculosis in

guinea-pigs. In subsequent experiments emulsions of glandular material were used not only to inoculate guinea-pigs but also to sow cultures; in addition cultures were sown from the glands and organs of the guinea-pigs which had been inoculated with the material. All the experiments, both cultural and animal, were negative. The evidence, therefore, is conclusive that the tubercle bacilli seen in the lesions were not living tubercle bacilli, either attenuated or of the avian type. They were dead."

TABLE IX.

Probable portal of entry	Number of cases	Type of infecting tubercle bacillus		Percentage bovine
		Human	Bovine	
Alimentary tract .. .. .	39	6	33	84.8
Respiratory tract .. .. .	100	99	1	1.0
Two routes, respiratory and alimentary ..	25	25	0	0.0
Uncertain .. .. .	7	7	0	0.0

Age periods	Number of cases	Types of infecting tubercle bacilli				Percentage bovine*
		Eugonic human	Dysgonic human	Bovine	Mixed human and bovine	
Under 5 years	103	72	0	29	2	29.1
5 to 9 years ..	50	42	1	6	1	14.0
10 to 14 years	6	5	0	1	0	16.6
15 and over ..	24	20	1	1	2	12.5
	193	139	2	37	5	22.4

\* Including four of the mixed infections, but excluding H 13 "A.D."

Organs containing the healed lesions	Number of instances	Tubercle bacilli found in	Guinea-pigs inoculated with negative results	Cultures negative in
Cervical glands .. .. .	41	19	63	32
Mesenteric glands .. .. .	42	15	98	14
Bronchial glands .. .. .	8	5	19	7
Lungs .. .. .	11	3	22	4
Spleen .. .. .	3	—	7	1
Liver .. .. .	1	—	2	—
Kidney .. .. .	1	1	2	1
Bones and joints .. .. .	62	2	80	38
Skin .. .. .	9	—	12	—
	178			

S. ROODHOUSE GLOYNE.

Reprinted from "Bulletin of Hygiene," Vol. 5, No. 8.

DE QUERVAIN, F. Zur Kropfprophylaxe durch Jodkochsalz. [Goitre Prophylaxis by Means of Iodized Salt.] *Schweiz. Med. Woch.*, 1929, Nov. 2, 1099-1101.

Vigorous opposition to the use of iodized salt in Switzerland has been advocated by Dr. F. BIRCHER (this *Bulletin*, 1929, v. 4, 1019), who has collected references from 38 papers drawing attention to the dangers of iodine medication in goitrous districts. These dangers are, however, already recognized by all experienced physicians and surgeons working in centres of goitre endemicity, including those who strongly advocate goitre prophylaxis by means of iodized salt. Indiscriminate treatment by iodine of goitres already present in adults is known to cause symptoms of hyperthyroidism, although there is virtually no risk of producing unpleasant symptoms in children by giving iodine preparations under skilled medical supervision. Many of the criticisms are levelled against the use of iodized salt and a large proportion of these are derived from American sources. Seeing that the Americans add 40 to 100 times more iodine to their salt than is recommended in Switzerland, it is not to be wondered at that cases of hyperthyroidism arise in America that may be directly due to overdoses of iodine. It remains the fact that the physiological doses of iodine recommended by the Swiss Goitre Commission have not been proved to cause symptoms of hyperthyroidism. Iodine prophylaxis of goitre is an empirical discovery and its recommendation does not imply a belief that iodine deficiency is necessarily the fundamental cause of endemic goitre.

S. J. COWELL.

Reprinted from "*Bulletin of Hygiene*," Vol. 5, No. 8.

LÖWENSTEIN, E. Die Methodik der Reinkultur von Tuberkelbazillen aus dem Blute. [Cultivation of *Mycobacterium tuberculosis* from the Blood]. *Deut. Med. Woch.*, 1930, v. 56, 1010. [1 ref.] [State Serotherap. Inst., Vienna.]

The author records the successful isolation of tubercle bacilli from the blood by the use of a special technique. The medium employed is as follows. A solution is prepared containing monopotassium phosphate 0.4 per cent., magnesium sulphate 0.04 per cent., magnesium citrate 0.1 per cent., asparagin 0.6 per cent., and glycerine 2.0 per cent. To 120 cc. of this solution are added 6 gm. of potato meal, and the mixture is left for 2 hours in the steamer. After cooling to 50° C., four whole eggs and 10 cc. of a sterile 2 per cent. solution of Congo Red are added, and the mixture is filtered through gauze. The mixture is then distributed into tubes and sterilized (in the sloping position) in the same way as Loeffler's serum.

The blood-culture is taken as follows: 10 cc. of blood are withdrawn into a tube containing 3 cc. of a 10 per cent. solution of sodium citrate and centrifuged with precautions as regards sterility. The supernatant plasma is removed, the corpuscles are dissolved with sterile acetic acid, and the

tube is again centrifuged. The deposit is then shaken up with 15 per cent sulphuric acid, for five minutes, sterile distilled water is added and the tube is centrifuged again. After one further washing to remove the excess of sulphuric acid the whole deposit is removed with a sterile pipette, and sown on the medium described above. A preliminary sowing may be made after the treatment with acetic acid.

With this technique, visible colonies often appear after twelve days' incubation. Positive blood cultures have been obtained from 5 of 7 cases of afebrile renal tuberculosis, from cases of glandular tuberculosis, from a small proportion of cases of tuberculosis of the skin, and from every case of severe pulmonary tuberculosis and of miliary tuberculosis which has been examined. In mild cases of pulmonary tuberculosis a positive result has not yet been obtained.

W. W. C. TOPLEY.

*Reprinted from "Bulletin of Hygiene," Vol. 5, No. 9.*

PETROFF, S. A. & STEENKEN, W., JR. **Biological Studies of the Tubercle Bacillus. I. Instability of the Organism—Microbic Dissociation.** *J. Exper. Med.* 1930, v. 51, 831-45, 9 pls. [10 refs.] [Trudeau Sanatorium, Trudeau, N.Y.]

The authors describe, and figure in a series of 48 photographs, colony-variants which they have obtained from human, bovine and avian strains of the tubercle bacillus, and from the B.C.G. strain. They point out that the term "dissociation," as at present employed, is not adequate to describe the instability which they have observed in their cultures, and that the terms "rough" and "smooth" must not be taken as possessing all the implications attaching to them in connexion with other bacterial groups. In their own description they use the term "rough" as indicating greater resistance to environmental conditions associated with a lower degree of virulence, the term "smooth" as indicating lessened resistance to environmental conditions associated with a higher degree of virulence. In particular circumstances the terms happen to be descriptive of the colonial appearances, for instance in the case of the avian bacillus growing on plain gentian-violet egg medium, or of the bovine bacillus growing on the same medium with the addition of 0.25 per cent. sodium tauro-cholate. Two extreme types of variant have been dissociated from four strains of B.C.G. obtained from different sources. One of these is capable of producing progressive disease, leading to death; the other is slightly virulent, or completely avirulent. [For details of the exact technique employed in these studies, which the authors regard as essential for successful isolation of the variants described, reference must be made to the original paper.]

W. W. C. TOPLEY.

*Reprinted from "Bulletin of Hygiene," Vol. 5, No. 9.*

OLDENBUSCH, C., FROBISHER, M., JR., & SHRADER, J. H. **Thermal Death Point of Pathogenic Bacteria in Cream and Ice Cream.** *Amer. J. Pub. Health.* 1930, v. 20, 615-18. [2 refs.] [Research Labs., Health Dept., New York].

Considerable study has been devoted to determining the thermal death points of various bacteria in milk. Little has been done to determine whether the time and temperature usually employed in pasteurization (143.5° F. for 30 mins.) is sufficient to kill the non-spore-bearing pathogenic bacteria which may contaminate cream or ice-cream. The authors have determined the time and temperature required to kill *Bact. typhosum*, hæmolytic streptococci, and the tubercle bacillus suspended in cream. Typhoid bacilli were killed at 135° F. in less than 10 mins., at 140° F. in less than 5 mins., and at 142°-155° F. in less than 3 mins. The streptococci did not survive heating at 135° F. for 5 mins., nor at 140°-142° F. for 1 min. Tubercle bacilli were killed, as tested by inoculation into the guinea-pig, in less than 20 mins. at 135° F., in less than 10 mins. at 140° F., in less than 7 mins. at 142°-143.5° F., and in less than 3 mins. at 145° F.

Similar experiments were carried out, using a commercial ice-cream mixture as the suspending medium, and typhoid bacilli, streptococci, tubercle bacilli and diphtheria bacilli as the test organisms. These tests were carried out at temperatures of 145° F. and 150° F. The results did not differ materially from those obtained with cream.

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Reprinted from "*Bulletin of Hygiene*," Vol. 5, No. 9.

ZELLER, H., WEDEMANN, W., LANGE, L. & GILDEMEISTER, E. Ueber die sog. niedrige Dauerpasteurisierung der Milch mit besonderer Berücksichtigung der Abtötung von Seuchenerregern. [Low Temperature Pasteurization of Milk with Particular Reference to the Killing of Disease-producing Agents.] *Arb. a.d. Reichs-Gesundheitsblatt.* 1929, v. 61, 1-72, 5 figs. [165 refs.]

This paper must be regarded as an extremely valuable contribution to the subject with which it deals. The first section is devoted to a résumé of the work on the subject previously carried out in various countries and the next to a description of the different types of apparatus that have been devised to carry out the pasteurization of milk on a commercial scale. There follows an account of the chemical, physical and biological changes produced in milk by low temperature pasteurization. The main changes are a decrease in the degree of acidity, an increase in the time required for spontaneous curdling to occur, and greater ease in separating the cream. Some of the albumin is coagulated and the caseinogen is altered so that it produces a less solid coagulum. No simple method of recognizing with certainty that milk has been treated by low temperature pasteurization was found. A great deal of new work is reported dealing with the effects

of low temperature pasteurization on the survival of disease-producing agents. The virus of foot-and-mouth disease was invariably killed, even when scabs from infected animals were added to milk; it was found to be impossible to infect guinea-pigs, calves, or pigs, with injected suspensions of the scabs after they had been heated for 30 minutes at 60-62° C. The *Br. abortus*, *Bact. coli*, various members of the paratyphoid group and *Bact. typhosum* were all completely killed. Streptococci obtained from cases of bovine mastitis were reduced in numbers, but not completely killed.

One third of the paper is devoted to a study of the very important question of the influence of low temperature pasteurization on the destruction of tubercle bacilli. The method adopted in the large number of experiments carried out was to feed calves and young pigs on milk which had been efficiently pasteurized in a recognized type of commercial apparatus, and after killing them to examine them for obvious tuberculous lesions, and in all cases of doubt to inject guinea-pigs with suspensions of any enlarged glands that might be found. Of 32 young pigs fed on untreated tuberculous milk, 29 had obvious tuberculous lesions, and the remaining three were shown to have infected foci by guinea-pig inoculation. Of 30 similar animals fed on pasteurized tuberculous milk, 25 developed no lesions, and no tubercle bacilli could be demonstrated in them by guinea-pig inoculation; in the remainder tubercle bacilli could be demonstrated only by inoculation of lymph glands into guinea-pigs. In the experiments with calves, 15 out of 16 fed with untreated tuberculous milk developed obvious tuberculous lesions; in the remaining animal no tubercle bacilli were demonstrated. Out of 22 calves fed with pasteurized tuberculous milk 18 remained completely free from infection. Three of the others developed obvious tuberculous lesions, and in the fourth infection could only be demonstrated by inoculation experiments. The milk used in these experiments was heavily infected with tubercle bacilli; the conclusion is therefore drawn that even under very unfavourable conditions low temperature pasteurization affords a very great deal of protection against tuberculosis, even though the protection is not absolute. It has been shown that high temperature pasteurization does not completely destroy either tubercle bacilli or streptococci in milk. Seeing, therefore, that low temperature pasteurization possesses many advantages that high temperature pasteurization does not possess, and at the same time possesses no corresponding disadvantages, the former method should be considered the method of choice. The sanctioning of the method by Government or local authorities concerned should nevertheless depend on the scrupulous inspection of the working of types of apparatus that have been proved to be efficient.

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Reprinted from "Bulletin of Hygiene," Vol. 5, No. 9.

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