<table>
<thead>
<tr>
<th>項目</th>
<th>内容</th>
</tr>
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<tbody>
<tr>
<td>タイトル</td>
<td>台湾におけるサルモネラ特に獣疫関係の報</td>
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<tr>
<td>著者</td>
<td>鄭清木</td>
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<td>雑誌名</td>
<td>長崎大学風土病紀要</td>
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Salmonella in Taiwan, Especially in Animal Diseases

(Preliminary report)

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Introduction

There are very few reports concerning the types and distribution of Salmonella group in Taiwan in the past. So, this preliminary report has been written mainly on the results obtained from our laboratory since 1958.

The chief domestic animals in Taiwan are pigs, fowls and cattle. The cattle include the yellow and buffalo cattle, but the dairy cattle are increasing in number recently under the government encouragement. Among the diseases of cattle in Taiwan, the protozoa infections and tuberculosis were rather prevalent in the past several years, and now though they decrease very much, yet they are also found sometimes as well as brucellosis and mastitis. But there is not any report concerning the salmonellosis in cattle before, and the author also has never made any investigation into the cattle. So the problems of salmonellosis in large animals in Taiwan area are not yet clear up, but we could say that the salmonellosis in cattle would not be serious in Taiwan according to the fact that no occurrence has been reported during the past few decades.

Now, the domestic animals in Taiwan which should be firstly taken care of concerning salmonellosis are the fowls (including chickens and ducks) and pigs, especially the former.

Therefore, on the following paper, the author wants to describe in rather detail about the salmonellosis in these two kinds of animals. Besides these animals, dogs will be also included in the domestic animals in Taiwan, and the isolated percentages of Salmonella from dogs are usually rather high in some countries (EDWARDS et al., 1948; SAKAZAKI, 1957). So on the standpoint of public health, we fell that that investigation on the distribution of Salmonella types in dogs is very important too. But now we are very sorry that we can't give reader a useful information concerning this problem, because so far no report has yet been available. But in February this year, we tried to isolate the Salmonella organisms from the feces of 40 domestic dogs, and have isolated 1 strain of S. weltevreden, 1 strain of S. litchfield and 1 strain of S. typhimurium. This fact indicates us that Salmonella may distribute as widely in dogs in Taiwan as it is in the other countries. The study on Salmonella in dogs is under way in our laboratory with the cooperation of the Animal Hospital of National Taiwan University, and the results will be reported in another later papers.

Now, on the salmonellosis in man, few reports are found in Taiwan too. And in this paper, the author has described something on the salmonellosis in man and the Salmonella types isolated from rats in Taiwan as an additional information. These date were mostly furnished by Dr. Hau, Taiwan Serum Vaccine Laboratory (TSVL), and so the author wishes to express his most

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sincere appreciation to him, here.

I. Salmonella in fowls (including chickens and ducks)

For discussing the chicken salmonellosis in Taiwan, it will be rather convenient to divide them into two parts: The one is salmonellosis caused by *S. gallinarum-pullorum*, so called, pullorum disease, and the other is salmonellosis caused by the other Salmonella organisms, generally referred to as the fowl paratyphoid infection. The former is different from the latter on its pathogenicity which produces septicemia with white diarrhea in specific host, baby chicks, as *S. typhi* produces typhoid disease in specific host of human being. And bacteriologically, the former organism is also different from the latter ones on its morphological appearance which has no flagellum. Then, in Taiwan, the occurrence of the former salmonellosis has been usually more overwhelming than the latter, and perhaps, this condition will be the same in every other country. But recently, the authors have observed two severe outbreaks of the latter salmonellosis in baby chicks which were produced by *S. weltevreden* and *S. potsdam* respectively. Furthermore, the authors also found that the dead chicken embryos were mostly caused by the Salmonella organisms except *S. gallinarum-pullorum*. Therefore the latter salmonellosis, so called paratyphoid, is being called attention to in Taiwan poultry farms gradually.

1) Pullorum disease

*S. pullorum* has been recognized as the causative organism of pullorum disease since its discovery by Rettinger (1889), and this organism used to be differentiated from *S. gallinarum* which was discovered by Klein (1989) in the differences of following properties:

- Size of colony, gas formation from glucose, fermentation of maltose, dulcitol and dextrin, production of hydrogen sulfide, utilization of d-tartrate, possessing O-1 antigen and pathogenicity to the adult chicken etc. However, many workers found that there were considerable confusion between these two species, so Kaufmann (1951) has suggested to combine them and speak of one serological *S. gallinarum-pullorum* type only which can be divided into different biochemical types, without giving these sub-types special names.

Cheng (1961) also has studied about the non-motile cultures belonging to Salmonella D group which were recently isolated from chickens in Taiwan, and has found that about a half (52%) of strains examined, showed complete typical biochemical properties of *S. pullorum*, but the remained strains all showed the intermediate biochemical characteristics between *S. pullorum* and *S. gallinarum*, and no strain gives the complete properties of *S. gallinarum*. This condition in Taiwan is just the same as it is in Japan, where it was reported by Ishii et al. (1958). These results indicated that the differential characteristics of *S. pullorum* and *S. gallinarum* were inconsistent and variable, so the author also supports the view of Kaufmann and has classified them into single type "*S. gallinarum-pullorum*".

The first incidence of pullorum disease in Taiwan had been reported by Ogura (1935) and the following outbreaks of this disease in baby chicks have never been ceased to exist every year after that. And the occurrences became more frequently especially after World War II, because a good many of foreign chickens have been imported from European and American areas, and the large poultry farms also have been established successively. In 1954 Hwang has investigated the pullorum carriers at the vicinity of Taipei (northern area of Taiwan) by means of the rapid whole blood agglutination test with standard type of pullorum K antigen, and reported that the positive percentage was above 5.585%. However in 1958 Cheng and Tung have made the same investigation, but using the polyvalent type of pullorum K antigen at the southern area of Taiwan, and found that 808 (18.9%) of 4,271 test birds showed the positive reaction to the pullorum whole blood agglutination test. Of course, in some flocks no reactor was
found, but in some other flocks more than 50% of positive reactors were recognized as pullorum carriers.

This high percentage of pullorum infection in Taiwan has called many workers' attentions not only on the view of poultry raising but also on the public health. However, since several years ago, the detection work of pullorum carriers had already been carried on here at least once a year legally, but in spite of that, the carriers have been increasing year by year. For solving this problem, therefore, the authors have made successive studies concerning pullorum disease and found the following results:

The antigenic structure of *S. gallinarum-pullorum* is: (1), 9, 12: -:-. However, in 1946, Edwards and Bunas, reported that the 12 factor was found to be divisible into three partial antigens designated 121, 122 and 123, and in standard antigenic type (S type) of *S. pullorum*, there was a dominance of the 122 antigen, while in variant antigenic type (V type) was a dominance of the 123 antigen, and the organism was also found to exist in an intermediate form (M type) in which both the 122 and 123 antigens were well developed. Furthermore, they also supported the opinion of Young (1941) that V type of *S. pullorum* may be incapable of stimulating agglutinins detectable with S type antigens, and they recommended to use the same type of antigens for detecting the carriers which were infected with the same type of *S. pullorum*. This was very noteworthy problem to us, so during the investigation of pullorum carriers, all the birds were tested and compared with two kinds of antigens: one is S type antigen made by Taiwan Provincial Institute of Animal Health (PIAH), and the other is polyvalent K antigen made in USA which contains both V and S types of pullorum organisms. The results, as have already been reported of in the previous papers of Cheng and Teng (1958) and of Cheng (1961), are that the polyvalent K antigen showed higher detecting percentages of pullorum carriers than the S type antigen. This indicated us, the V type of *S. gallinarum-pullorum* might be distributed rather widely in Taiwan, so the author (Cheng, 1961) has scheduled the further study on the serotypes of *S. gallinarum-pullorum* in Taiwan. According to the results of this study, we have known that about 80% of *S. gallinarum-pullorum* in Taiwan may belong to M type, but S type and V type also occur in about 10% respectively. And among the M types, many of strains may possess the properties inclining to V type, and the carriers infected these so called MV type of *S. pullorum* may be sometimes also incapable of stimulating agglutinins detectable with S type antigens. Later, Suss et al. (1961) and PIAH, also have made same investigation on the serotypes of *S. gallinarum-pullorum* in Taiwan, and they reported that 37.5% of total isolated strains were of the V type. It that study, they only used a simplified method described by Williams and Harris (1955) to determine serotypes of the isolates, so the data could not help being rather rough, but in either case it is unquestionable that there are considerably V type and MV type of *S. gallinarum-pullorum* in Taiwan. So we had better prefer the polyvalent antigen for the pollorum test in Taiwan. However the antigens made in Taiwan before only contained S type of the organisms, therefore they couldn't detect some carriers infected with V or MV type of *S. gallinarum-pullorum*, and let them remain in the flocks as the source of infection, hence it seems to be quite reasonable that the number of reacted birds would increase very much, when the polyvalent antigens were used in Taiwan for the first time. Actually the Taiwan Provincial Institute of Animal Health accepted the author's opinion, and has produced the polyvalent pullorum antigen since several years ago. And in the beginning, when they used this new product, they also found that usually more than 10% of test bird have showed positive reaction to the polyvalent antigen. Last year, however, the average percentage of pullorum carriers was brought down to 5.6% (PDAF, 1964), because of using the same antigen successively,
Salmonella in Taiwan

and it would be decreased much more this year by means of using the more effective pullorum K antigen (Animal Diseases Eradiation Division) and the more effective detecting method of 5 Times Early Stage Test System (5 TESTS) which was suggested by us (CHENG, 1962; CHENG and TUNG, 1963; 1964).

As mentioned above, the pullorum carriers are quite frequently found in many poultry in Taiwan, nevertheless the occurrence of the disease (white diarrhea) in baby chicks are not so frequently found recently. This may be due to the various kinds of antibiotics, sulfonamides or some of nitrofuran derivatives are usually mixed into the feeds. TUNG(1963) has studied on the several factors which may influence the infection of pullorum disease in chickens. According to this report, the development of poultry equipments, the improvement of managements may also be considered as factors to influence the occurrence of the disease. But it is important that though the pullorum disease with symptoms are not found apparently, but practically the chicks are easily infected with the organism and will become pullorum carriers. So it should be continued to detect the pullorum carriers from all of the poultry farms on the view of poultry raising and public health.

(2) Salmonellosis caused by the other types of Salmonella organisms except S. gallinarum-pullorum

It is believed by many workers that the chicken salmonellosis caused by the other type of Salmonella except S. gallinarum-pullorum usually referred as fowl paratyphoid has already occurred in the past in Taiwan. But because the occurrences are also limited on baby chicks, and their symptoms are so quite similar to the pullorum disease that they would be simply diagnosed as pullorum disease without further serotyping studies. The authors (TUNG and CHENG, 1963) have reported a severe outbreak of S. weltevreden infection in baby chicks which have been also diagnosed as a simple pullorum disease by other laboratories. Afterward the authors have found a pullorum-like disease with high mortality in our experimental baby chicks just bought from one of the poultry farms, but we have only isolated S. potdam, not S. gallinarum-pullorum from all of dead chicks. Furthermore, they have proved in the same paper that the baby chicks are easily infected with these isolated organisms respectively, and may show pullorum-like symptoms and they will also become carriers as they are infected with S. gallinarum-pullorum. However in the pullorum disease the organisms were reported to stay more on the serous membrane, especially, of genital organs in carriers (SUGANUMA, 1959), but in the paratyphoid disease, the authors recognized that the organisms are more easily found in the cecum of carriers. So it will be able to understand that the pullorum organisms are usually found in eggs laid by their carriers, but the paratyphoid organisms are usually detected on the shells of eggs, because the contamination of organisms will happen at cloaca of carriers in the latter case, therefore it will be quite effective to disinfect the shells of eggs and incubator for controlling the fowl paratyphoid infection. The authors also have ever proved to control a severe outbreak of S. weltevreden only by doing completed disinfection. According to the facts mentioned above, the authors believed that the distribution of Salmonella in fowls will be widely spread in Taiwan. Since April of this year, we have been beginning to survey the types of Salmonella distributed in fowls under the cooperation of some commercial hatcheries and fowl butcheries (chicken meat stores). The dead embryos of chickens or duck were mostly used for the isolation of the organisms, and then the content of ceaca of slaughter fowls and the marketing eggs were also supplied as the material for examination. This work has just been begun, so the results will be reported on the later paper in detail. But now the author wants to report some result as the initial data here which we have got until now. Table 1 shows the
Table I. Salmonella isolated from fowls

<table>
<thead>
<tr>
<th>Origin</th>
<th>Cases examined</th>
<th>Salmonella types isolated</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>S. gallinarum-pullorum</td>
</tr>
<tr>
<td>Chickens</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dead embryos</td>
<td>513</td>
<td>6</td>
</tr>
<tr>
<td>Natural infected dead chicks</td>
<td>16</td>
<td>5</td>
</tr>
<tr>
<td>Adult slaughtered</td>
<td>83</td>
<td>33**</td>
</tr>
<tr>
<td>Ducks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dead embryos</td>
<td>186</td>
<td></td>
</tr>
<tr>
<td>Shells of marketing eggs</td>
<td>105</td>
<td></td>
</tr>
<tr>
<td>Adult slaughtered</td>
<td>155</td>
<td>1*</td>
</tr>
<tr>
<td>Total</td>
<td>1,058</td>
<td>44</td>
</tr>
</tbody>
</table>

* Isolated from the contents of caeca of healthy slaughtered.
** Isolated from the birds which show positive reaction to the pullorum agglutination test.

serotypes, their origins, and case number of Salmonella isolated from fowl materials up to the present in our laboratory. Though this is only an initial report, yet the readers will be able to get some idea of the distribution of Salmonella in fowls in Taiwan from these figures.

According to the data from Table I, S. enteritidis is the most frequently encountered type, except S. gallinarum-pullorum, then S. potdam and S. typhimurium follows them. However, S. weltevreden is also important one, because, it is not only isolated from chicks but also from rats, and recently the authors also isolated it from the feces of dogs. So it will be considered that the distribution of S. weltevreden is fairly wide in Taiwan, in addition, this kind of organisms not only has pretty pathogenicity to the baby chicks, but also frequently causes the gastroenteritis in man (KOBARI et al., 1961). So on the view of public health, we should pay more attention to this organism in future.

II. Salmonella in pigs

Among the salmonellosis of pigs in Taiwan, the infection pneumonia caused by S. typhisuis and S. choleraesuis will be the most important one. Though the disease caused by S. typhisuis seems to be fewer in recent years, but the swine pneumonia caused by S. choleraesuis is quite frequent at the present time, yet. The course of the disease by these organisms are generally chronic, and very consumptive, and pathologically, the infected lungs usually show the supplicative pneumonia. Because the prognosis.
of the disease is usually unfavorable, and the treatment is also less economic, they have made great losses in swine in production every year in Taiwan.

The author (Cheng, 1958) has made bacteriological examination with 88 cases of swine infections pneumonia collected from several localities of Taiwan and has isolated S. choleraesuis from 25 cases (28.4 %), and S. typhisuis from 5 cases (5.7 %). On the contrary, Pasteurella multocida was isolated only from 18 cases (20.5 %), though this organism was reported to be most frequently encountered species in swine pneumonia in other countries (usually it may occupy more than 50 %—Spray, 1922; Marcos et al.; 1947, Ryu, 1954). Nevertheless, S. choleraesuis was frequently isolated with hog cholera virus, but in sometimes it will be isolated from sick pigs without any other causative agents. During recent years, the hog cholera is less found in Taiwan since the rabbinated hog cholera living vaccine has been widely used, but swine pneumonia caused by S. choleraesuis are still prevalent now. This forms a very interesting contrast with our neighboring country, Japan, where S. choleraesuis could hardly be found now (Sakazaki, 1957; 1962; 1964). Recently, the authors have examined with 501 cases of healthy mesentric lymph glands of pigs which were collected from some abattoirs, and also isolated 3 strains of S. choleraesuis and 2 strains of S. derby. From this result, it will be described that S. choleraesuis may occur in the body of healthy pigs, and if some of stress factor exist, the organism may multiply rapidly and cause the diseases. Practically, the authors have many experiences to isolate S. choleraesuis from the pigs which were induced to suffer from pneumonia by vaccination of rabbinated hog cholera vaccine.

On the types of Salmonella isolated from pigs in Taiwan, except S. choleraesuis, S. typhisuis and S. derby have been isolated by authors, then S. typhimurium and S. paratyphi C also have been recognized by Dr. Hsu et al., when they made typing the organisms isolated from pigs sent from PIAH. Now, Table 2 will show the types

<table>
<thead>
<tr>
<th>Condition of pigs</th>
<th>Isolated organs</th>
<th>Cases examined</th>
<th>S. choleraesuis</th>
<th>S. typhimurium</th>
<th>S. typhi-suis</th>
<th>S. derby</th>
<th>S. paratyphi C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health</td>
<td>Lymph gl. of mesentry</td>
<td>501</td>
<td>3</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pneumonia with hog cholera virus infection</td>
<td>Lung</td>
<td>43</td>
<td>9</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pneumonia without hog cholera virus infection</td>
<td>Lung</td>
<td>45</td>
<td>16</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dead after vaccination with rabbinated hog cholera vaccine</td>
<td>Lung, liver, lymph gl.</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unknown</td>
<td>Lung, liver, spleen, lymph gl.</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>39</td>
<td>5</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
of Salmonella isolated from pigs in Taiwan up to the present.

### III. Salmonella in men and rats

According to the health statistics of Provincial Government (1961), salmonellosis of men in Taiwan are mostly caused by *S. typhi*, *S. paratyphi A* and *S. paratyphi B*. The highest occurrence was found in 1942, and during that year 436 out of 2,104 infected persons died by the infection, however the occurrence has decreased to about 200 cases a year since 1950, and it decreased more evidently since 1959, and at the present time, only about 100 cases may be found in a year. The mortality also apparently decreased year by year, and now there seems to be no death from this disease, because many kinds of effective antibiotics and chemical agents were used for the treatment. In 1963 Hsu et al. have isolated 2 strains of *S. paratyphi A* and 2 strains of *S. paratyphi B* from food-poisoning affairs of men in Taiwan (Hsu, 1964).

Next, the author wants to describe something about the distribution of Salmonella in rats in Taiwan, because this animal is closely related to men and domestic animals. In 1962, Hsu (1964) examined 120 rats (*Mus musculus Linnaeus*) caught at the neighborhood of Taipei, and isolated 3 strains (2.5 %) of *S. enteritidis*; and in 1960, his assistant also isolated from rat in National Taiwan University, and found that the organism was *S. weltevreden*. Though the investigation data are few, but according to the reports mentioned above, there will be no doubt that the rats in Taiwan may carry many types of Salmonella organisms in a rather higher percentages, though in Japan (Sakazaki, 1964) the percentage of

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**Table 3. Types of Salmonella isolated in Taiwan (1958-1964)**

<table>
<thead>
<tr>
<th>Group</th>
<th>Type</th>
<th>O antigens</th>
<th>H antigens</th>
<th>Isolated cases</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>phase 1</td>
<td>phase 2</td>
<td></td>
</tr>
<tr>
<td>A</td>
<td><em>S. paratyphi A</em></td>
<td>1, 2, 12</td>
<td>a</td>
<td>Men Chickens Ducks Pigs Rats Dogs</td>
</tr>
<tr>
<td></td>
<td><em>S. paratyphi B</em></td>
<td>1, 4, 12</td>
<td>f, g</td>
<td>2 * 1</td>
</tr>
<tr>
<td></td>
<td><em>S. derby</em></td>
<td>1, 4, 12</td>
<td>i</td>
<td>2 2</td>
</tr>
<tr>
<td></td>
<td><em>S. typhimurium</em></td>
<td>1, 4, 12</td>
<td>1, 2</td>
<td>12 1 * 1</td>
</tr>
<tr>
<td>C-1</td>
<td><em>S. paratyphi C</em></td>
<td>6, 7, Vi</td>
<td>c, 1, 5</td>
<td>7 18</td>
</tr>
<tr>
<td></td>
<td><em>S. choleraesuis</em></td>
<td>6, 7</td>
<td>c, 1, 5</td>
<td>39 5</td>
</tr>
<tr>
<td></td>
<td><em>S. typhimurium</em></td>
<td>6, 7</td>
<td>l,v</td>
<td>5</td>
</tr>
<tr>
<td>C-2</td>
<td><em>S. newport</em></td>
<td>6, 8</td>
<td>e,h</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td><em>S. litchfield</em></td>
<td>6, 8</td>
<td>l,v</td>
<td>1</td>
</tr>
<tr>
<td>D</td>
<td><em>S. typhi</em></td>
<td>9, 12, Vi</td>
<td>d</td>
<td>27 *</td>
</tr>
<tr>
<td></td>
<td><em>S. enteritidis</em></td>
<td>1, 9, 12</td>
<td>g,m</td>
<td>17 17</td>
</tr>
<tr>
<td></td>
<td><em>S. gallinarum-pullorum</em></td>
<td>(1), 9, 12</td>
<td></td>
<td>4 *</td>
</tr>
<tr>
<td>E-1</td>
<td><em>S. anatum</em></td>
<td>3, 10</td>
<td>e,h</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td><em>S. weltevreden</em></td>
<td>3, 10</td>
<td>r, z6</td>
<td>1 *</td>
</tr>
</tbody>
</table>

**Total** | 32 | 80 | 47 | 48 | 6 | 3

Remarks: (1) All the strains were isolated by our laboratory except those with * which were isolated by Taiwan Serum Vaccine Laboratory.

(2) All the types except *S. paratyphi C*, *S. typhimurium* and *S. anatum* were found during 1963-1964.
Salmonella in rats is reported to be about 1% now. So the examination of rats here will be effective to control the transmission of salmonellosis in men or domestic animals.

As mentioned above, though Salmonella organisms were so frequently isolated from animals, the cause of food-poisoning in men caused by Salmonella have rarely been reported officially, except *S. paratyphi* A or B. However, some researchers (including us) believe that food-poisoning in men caused by several types of Salmonella might exist here, but many of the clinical physicians will not take more care of this disease, and they usually will not send the materials to the laboratory for further examinations, because the occurrence of salmonellosis was usually sporadic and the treatment has become easier in recent years. So it would be hard to get more complete data on the distribution of Salmonella types in men, is there are no active helping by all the clinical physi-
in Taiwan.

**Conclusions**

There has been very few report concerning Salmonella in Taiwan before, except pullorum disease in chickens and typhoid or paratyphoid in men. Then the author feels that the investigations with the types and the distribution of Salmonella group in Taiwan are the valuable work both on the view of public health and animal industry. So we have been working actively on this investigation, mostly with fowls and hogs since February, 1964, and until now we have isolated more than 170 strains together with the strains which were isolated by us during the past several years.

On the other hand, at Taiwan Serum Vaccine Laboratory, Dr. Hsu et al. have isolated some types of Salmonella mostly from men and rats since 1960.

All these data may be concluded as in following Table 3, though it only shows the initial statistics, but one may get some general idea concerning Salmonella in Taiwan from these data. According to the results shwon on the following table, we would say that in men *S. typhi, S. paratyphi* A and *S. paratyphi* B may be the mostly found types of Salmonella in Taiwan, and in fowls, *S. gallinarum-pullorum, S. enteritidis, S. postdam, S. typhimurium* and *S. weltevreden* may be frequently found, then in pigs, *S. choleraesuis* may be the mostly isolated type of Salmonella in Taiwan now. And it would be said that frequent occurrence of *S. choleraesuis* and *S. weltevreden* will be one of the characteristics in Taiwan.

**Acknowledgment**

Some of the date concering human salmonellosis were furnished by Dr. Hsu, Taiwan Serum Vaccine Laboratory, and the serological typing of some strains were helped by Dr. R. Sakazaki, Salmonella Center, National Institute of Health, Tokyo, and many jobs were assisted by Mr. M. C. Tung, assistant of Department of Veterinary Medicine, Taiwan Provincial Institute of Agriculture. The author wishes to express his most sincere appreciation to them.

**References**

5) Cheng, C. M.: The observation on the
appearance of antibodies and the excretion of 
S. gallinarum-pnllorum from some artificially 
6) Cheng, C. M. and Hwang, U. C. : A study 
on the pullorum disease in adult chickens in 
Taiwan. 1st report. Bull. Taiwan Prov. 
7) Cheng, C. M. and Tung, M. C. : An experiment 
with raising pullorum-free flocks. Part 1. 
The elimination of pullorum carriers from the 
breeding flocks according to 5 TESTS. Bull. 
8) Cheng, C. M. and Tung, M. C. : An experiment 
with raising pullorum-free flocks. Part 2. 
The certified test with the offsprings from 
the 5 TESTS breeding flocks. Bull. Taiwan 
9) Department of Health, Taiwan Provincial 
Government : Statistics of Health in Taiwan. 
1961.
10) Edwards, P. R. and Bruner, D. W. : Form 
variation in S. pullorum and its relation to X 
11) Edwards, P. R. et al. ; The Genus Salmonel-
la ; Its occurrence and distribution in the U. 
Kentucky, Lexington, 1948.
12) Edwards, P. R. et al. : Further studies on 
the occurrence and distribution of Salmonella 
types in the U. S. J. Inf. Dis. 83 : 220-230, 
1948.
13) Hsu, S. T. : Symposium on the types of 
Salmonella and Shigella in East Asia. 37th 
1964.
14) Hwang, J. : A preliminary survey on the 
incidence of pullorum disease in adult chickens 
in Taipei. Agr. and Forestry Communication, 
Taiwan. 7 (1) : 75-78, 1954.
15) Ishii, F. et al. : Distribution of S. gal-
16) Kauffmann, F. : Enterobacteriaceae. Mun-
ksgaard, Copenhagen. 1951.
17) Klein, E. : Uber eine epidemiche Krankheit 
der Hiihner, verursacht durch einen Bacillus, 
Bacillus gallinarum. Zbl. Bakter. I. 5 : 689, 
1989.
18) Kobari et al. : A case of food-poisoning 
(cf. Ryu).
20) Ogura, K. : Pullorum disease in Taiwan. 
Agr., Central Inst., Taiwan. 137, 1937.
21) PDAF : General Report on Pullorum Control 
22) Retger, L. F. : Septicemia among young 
23) Ryu, E. : Memoirs of the College of Agr., 
National Taiwan Univ. 314. 1944.
24) Sakazaki, R. : Pathogenic intestinal bac-
teria with special reference to Salmonella and 
1957.
25) Sakazaki et al. : Host-parasite-relationship 
from the view-point of Salmonella distribution. 
26) Sakazaki, R. : Epidemiology and pathogeni-
city of Salmonella in Japan ; Investigation 
during the past 15 years. J. Jap. Assoc. Inf. 
27) Sakazaki, R. : Symposium on the types of 
Salmonella and Shigella in East Asia. 37th Gen. 
Meeting of Japan. Bacteriol. Soc. (Nagasaki), 
1964.
28) Shieh, T. M. et al. : The bacteriological 
examination of the birds showed positive 
reactions to the rapid whole blood test. Report 
of Anim. Husb. and Vet. Med. in Taiwan, 
Division of Anim. Husb., P. D. A. F. (Taiwan). 
3(3) : 6-11, 1961.
29) Spray, R. S. : Bacteria in normal and diseas-
ed lungs of swine. J. Inf. Dis. 31 : 10-21, 
1922.
30) Suganuma, Y. : Histological investigations 
on the specificity of serum-reactions on the 
Salmonella in Taiwan

Univ. No. 10, 1959.


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**摘 要**

台湾では従来、幼鶏の白痢症と人類のチフス・パラチフスに関する以外サルモネラの研究は余り行われていなかった。この種の研究を更に一般に推進することは台湾の公衆衛生と畜産の面で極めて大切なことである。著者は本論文の前半で、白痢症特に *S. gallinarum-pullorum* によるものに関する研究の結果を要約し、後半では、1963年幼鶏間に *S. weltevreden* による疾患の集団発生観察を機会に開始した各種動物サルモネラ探索の一部成績を末報の形で述べ、また台湾血清疫苗研究所所長博士等実施の人体及び関係動物よりのサルモネラ分離ならびに分型成績を紹介した。

台湾で人類病原型の主体をなすものは *S. typhi, S. paratyphi A, S. paratyphi B* で、鶏や家鴨からは *S. gallinarum pullorum, S. enteritidis, S. pottsdam, S. typhimurium* 及び *S. weltevreden* が、豚からは *S. choleraesuis* がよく検出される。これらのうち *S. choleraesuis* と *S. weltevreden* が特に高い頻度で検出されることは台湾を特色づけるものといえよう。