the perineal region, with the first incision of initial dressing of the carcass, but ante-mortem they are difficult to palpate in that region. Inspection of the tongues of pigs for measles has been practised since the days of Aristophanes, was commonly practised in Germany and in France in the Middle Ages, and is practised in most countries, where porcine cysticercosis is a common disease, at the present time. Tongue inspection is a common practice of South African farmers, some of whom consider themselves experts and have actually told me that only a certain percentage of their pigs reach the Bloemfontein Abattoir, since they withhold all pigs found to be measly by means of the tongue inspection, and they sell such pigs to their natives, instead of providing us with so much material for our by-products department.

The South African method of inspection consists of the following:- The pig is thrown onto its side. Taking advantage of its squeals, a stout stick or plank is forced between the jaws, and with his hand wrapped in a towel or cloth, the farmer grabs the tongue, pulls it out of the mouth and examines it. His native attendants, meanwhile, use the stick as a lever to hold the mouth open. The Serbian method of inspection, according to Kukuljevic (1906), was almost identical to the South African method.

That measles can only, with certainty be diagnosed in very grossly infested cases, is shown by the following observations conducted at Bloemfontein Abattoir, where we instituted a three months' inspection of living pigs' tongues.

During that period exactly 25% of the total measly pigs slaughtered showed *cysticerci* in their tongues.

NATURAL INFECTION OF THE PIG.

The pig is naturally a scavenger and burrower, and may almost be termed omnivorous. When not confined to a sty, it's natural instincts are to haunt the precincts of rubbish heaps, manure and excretum dumps, latrines and the dirtier parts of the farm-yard. In the more primitive parts of South Africa, among European as well as native habitations, pigs frequently have the run of the farm-yard, and may even enter the kitchen or native huts. On many of those farms latrines or privies are neither provided for Europeans nor natives, and in the vicinity of native huts, or in the rural locations and reserves such commodes are quite unknown. The primitive and unhygienic farmer, and nearly all natives will walk barely a hundred yards from the homestead in order to perform their natural functions. That type of farmer (fortunately becoming more scarce) or native very rarely takes the trouble to sty his pigs. The only feed which is provided for the unfortunate pigs consists of an occasional ration of pumpkin, a few mealies, potato peels and other rubbish from the kitchen, and further the pigs must forage for themselves. The most natural result is that the pig will follow its owner and act as an "efficient scavenger". It is well known that among many of our so-called "Poor Whites" this mode of scavenging is encouraged. I was once told that privies on farms

were unnecessary evils, since they stank and encouraged flies. That particular "farmer" and his entire household used the rear of a quince hedge close to the homestead, since it was far "cleaner and the pigs cleaned up everything."

In the Western Cape pigs are frequently driven to pick up acorns under the beautiful old oaks on the farms. Unfortunately, at the same time the farmers' Cape Coloured servants select the shade of those oaks as lavatories. Heavy infestations among Cape pigs frequently follows.

Le Coultre (1928) relates a similar state of affairs among the native Balinese. He picturesquely describes the remarks of an old Headman who stated that he merely whistled for his pig to come along and clean up his excretum. Except for the fact that the primitive ones among our South African farmers and natives have perhaps not trained their pigs to follow their whistles, there is very little difference between our most primitive farm hygiene and that of Bali.

Undoubtedly a similar state of affairs must exist in the more primitive parts of Russia, Serbia, Lithuania and other parts of Europe, where the incidence of C. cellulosae is still high.

Commenting on the usual heavy nature of infestation in pigs, Veenstra (1921) asks the following questions:- "Does a pig generally become more heavily infested than a bovine? Or do the eggs develop more readily in the pigs' bodies than in those of bovines? Or do more T. saginata eggs get lost into the soil?" He then adds that pigs are less particular than bovines

in picking up their food. Veenstra's queries can be elucidated by the fact that proglottides of T.solium are voided in chains, seldom singly, and although the majority of the eggs may escape from the proglottis, the contact intestinal faeces of the human host must, therefore, probably carry more T.solium eggs than would be the case with T.saginata, where segments are voided singly and sometimes spontaneously. In other words, more Taenia solium proglottides become gravid and "ripen" at a time than those of Taenia saginata. It stands to reason, therefore, that the voracious pig, in ingesting, as it commonly does, an entire human stool, will take in many thousands of ova.

Infection of the pig with C.cellulosae can only result from the ingestion of ova of T.solium, most frequently obtained by the ingestion of entire stools, or from the ingestion of excreted gravid proglottides in which ova may still be present.

Unfortunately, infection of pigs belonging to scrupulously particular farmers may occasionally result, owing to the wantonness of their native swine-attendants. Three such instances occurred in the Bloemfontein District within a few weeks of each other, during the past year. Each of the three farmers could be classed among the foremost pig breeders in the Province, and when measles were found among a number of their respective pigs, their faith in the theory of the mode of infection was rudely shaken. One of them told me he could not believe it, since his pigs were scrupulously stied and fed, a fact of which I had already full knowledge.

I told each farmer that I was sure one of his native staff had been relieving himself in his sty, and advised them to keep a careful watch. It was not long after, when two of the three farmers enthusiastically told me that each had caught a native, one of whom actually carried tapeworm, in the act. What those two farmers did to their respective native culprits was not mentioned, but can well be imagined!

According to Gerlach infection of the pig occurs more readily in the young subjects, e.g. up to half a year old. On the other hand there are not many records of infection in sucking pigs. The reason for this may be that sucking pigs remain with the dam, and their diet consists mainly of milk. They are, therefore, not scavengers. Unlike infection of the bovine with C. bovis, intra-uterine infection of foetuses with Cellulosae has seldom or very rarely been recorded. Hervieux (1838) recorded a case in sucking pigs. "The sucking pigs were found affected with measles - two in a litter of twelve." He further hinted at prenatal infection:- "A sow that was reared by the writer, was mated to a very healthy boar, and the former bore six measly sucklings."

At Bloemfontein our record of the youngest measly pigs was 10 weeks. In December 1934 we found four out of a consignment of six small sucking pigs, 10 weeks old, to be heavily infested with mature viable measles.

DIAGNOSIS AND DIFFERENTIAL DIAGNOSIS OF C. CELLULOSAE IN PORK.

In ante-mortem cases, except for the examination of the tongue already described, there is no practical method of diagnosis. Serological tests have been tried, but are not specific and are not practical under ordinary conditions. Sparapani (1915) tried precipitin tests.

On post-mortem examination, or in practical meat inspection, there is really only one parasite which may be confused with C. cellulosae, viz. C. tenuicollis, the immature stage of T. hydatigena (marginata) of the dog. As a general rule the latter cysticercus does not develop in muscles, and is most frequently found under the large serous membranes, the peritoneum and pleura, and chiefly in the omentum, mesentery and liver. Its size may vary from that of a pea to that of a tennis ball. When situated in the parenchyma of the liver, it may be confused with C. cellulosae, since its size is restricted, seldom exceeding that of a pea. Older text-books and writers maintained that C. tenuicollis was never found in muscle fibres. Recently Mönnig (1934), referring to some American literature, stated that "Cysticerci (tenuicollis) developing in muscles may not be so large and have possibly sometimes been mistaken for C. cellulosae." Larger vesicles, e.g. those found under serous membranes, on the omentum, etc., are filled with fluid, may be quite flaccid, and are hardly likely to be mistaken for C. cellulosae. These larger cysticerci evaginate the scolex very easily, and reveal a scolex with an unusually long neck, from the end of which hangs

the flabby bladder. The evaginated scolex may be studied and will reveal a rostellum bearing two rows of hooks numbering from 26-44 (cf. C. cellulosae 22-32.) The larger hooks are 0.17 to 0.22 mm. long (cf. C. cellulosae 0.16 to 0.18 mm.) and the smaller hooks 0.11 to 0.16 mm. (cf. C. cellulosae 0.11 to 0.14 mm.)

The hooks of C. cellulosae are more curved (sickle-shaped) than those of C. tenuicollis (scythe-shaped). According to von Ostertag, the root process of the smaller hooklets of C. cellulosae has no cleavage as is found in that of C. tenuicollis. In the 1913 edition of von Ostertag's "Handbook of Meat Inspection" mention is made that "Schwarz examined 1000 specimens each of C. cellulosae and C. tenuicollis. He noticed that in C. tenuicollis as a rule one or more small hooklets were demonstrable, the basal process of which was bifurcated. In the thousand specimens of C. cellulosae examined by Schwarz this was not the case in a single instance. Reissmann has confirmed these observations." In his 1934 "Text-book of Meat Inspection", however, von Ostertag mentions that the small hooklets of C. tenuicollis are characterized by their bifid form, "but it must be noted that in the small hooklets of C. cellulosae there is also a division through a median furrow."

Manegold (1931) showed the tremendous variations between the number of hooks, predilection sites and size of C. cellulosae, C. tenuicollis and C. ovis quoted by different text-books and authorities. In order to establish a differential diagnosis he found that 32 hooks were the commonest in 500 C. tenuicollis scolices, not 36-38 as was frequently quoted in many text-books. In the majority of

cases (95.6%) 28-36 hooks were found.

It is very improbable that C. cellulosae will be confused with any other pathological conditions, but the following have been mentioned in discussions on differential diagnosis:-

(a) Echinococcus cysts. These either have no scolex (sterile form), or numerous brood capsules, each with many scolices. The cuticle of the Echinococcus is thick and concentrically laminated.

(b) Calcified C. cellulosae may (very improbably) be confused with calcified Sarcosporidia - Sarcocystis miescheriana. These parasites may be about 4 mm. long by 3 mm. wide, readily undergo calcification, and are the commonest form of calcareous concretion in the muscle fibres of swine. They are especially found in the abdominal muscles and the diaphragm. (They are more likely to be confused with Trichinella spiralis.) In uncalcified specimens the sickle-shaped sporozoites may be demonstrated.

(c) Small actinomycotic nodules may possibly be taken for Cysticerci cellulosae. In actinomycosis radiation of the mycelium may be demonstrated microscopically.

(d) Tuberculosis of lymphatic glands may be confused with caseous cysticerci in those locations. Microscopical examination will settle the diagnosis.

Dead (caseous) C. cellulosae may be identified microscopically by demonstration of the characteristic calcareous corpuscles

and the nature of the hooklets.

Vosgien (1911) mentions two methods of identifying C. cellulosae in sausages and other minced meats. The first is that of Schmidt-Mulheim, in which the product is warmed to 40°C. in 6 to 8 times its volume of a 1 in 200 hydrochloric acid solution. Cysticerci with hooks resist this treatment and become visible. The second is that of Rissling, who employed a soda solution.

INFECTION WITH CYSTICERCUS CELLULOSAE OF OTHER ANIMALS.

The only other animals in which infection with Cysticercus cellulosae need be discussed are man, the dog and the monkey. Human cysticercosis will receive consideration later in this work.

Infection in the dog has generally been accepted as a scientific fact, whereas until 1936 few authentic cases in the monkey were recorded. In 1936 Walker recorded what he believed to be a definite case of C. cellulosae in a monkey. He mentions that the monkey is cited in many scientific books as an intermediate host of ~~Cysticercus cellulosae~~ Taenia solium, but in actual fact the condition in that animal has extremely rarely, authentically, been found. Medical literature during the past 50 years has been silent on that subject, and the only other records which Walker could find were four cases mentioned by Vosgien, the one found in the eighteenth century, and the other three in the nineteenth century.

Relating the case history of his subject, Walker reminds us that the exact incidence of infection in monkeys will not be known until post-mortem examinations are systematically performed on large colonies of monkeys, over a prolonged period of time. His subject was an immature Macaca mulatta, bought from an eastern animal dealer. Enquiry from the dealer led to the information "that the animals in that lot were from Lucknow, that several had worms, got very skinny and eventually died." Apparently the type of worm was not investigated. A large flap of bone was turned down on the left side of the skull, with the intention of stimulating the cerebral cortex, but upon opening the dura mater "quite unexpected pathology was found". "Both in the subdural and subarachnoid spaces were numerous cysts ranging in size from 3 mm. to 15 mm. Those in the subdural space were so loosely attached that when the dura was opened they fell out. Even those in the subarachnoid space enucleated readily when the arachnoid was nicked." On close examination Walker saw several cysts within the brain substance, partially covered by the cortex. After this he killed the monkey and did a complete post-mortem examination. He found that practically every muscle in the body contained one or more cysts. He gives the following description of his observations:- "The muscles of the back had many; those of the extremities likewise were studded with cysts. Even the intercostal muscles and the diaphragm had cysts . Two cysts were found within the heart muscle. The liver, spleen and both kidneys contained typical cysts. There was no evidence of any primary worm from which the infection may have arisen."

Walker then proceeds to describe the microscopical features of the scolices of the bladderworms. He points out that the severe pathology of human cysticercosis was not observed in the monkey. When the scolices were examined under the microscope "four suckers, surrounding the rostellum with a number of hooklets" were seen. The actual number and the characteristic features of the hooklets were not mentioned, and this fact may be cited as the main argument against the diagnosis of Walker, who maintains that he had dealt with a typical case of C. cellulosae. He, somewhat inconclusively, unfortunately, claims that "the presence of both suckers and hooklets on the scolex serves to define the larva as that of the Taenia solium."

Nevertheless, Walker has apparently been the first author in the last 50 years to have described a case, which to all appearances may be accepted as a case of generalized Cysticercus cellulosae in a monkey.

If Walker's diagnosis is scientifically correct, it is quite possible that, as he has pointed out, the incidence may be higher than has been anticipated among the various species of monkeys. In South Africa it has been noticed that most tamed monkeys are scrupulously particular of their food. In the wild state it may be possible that monkeys will eat human excretum, especially if other normal foods are scarce, and ova of Taenia solium may be consumed by the ingestion of contaminated roots, herbs, etc. It is also not at all unlikely that human beings may contract Taenia solium through eating measly monkey flesh, since

in South Africa several native tribes, e.g. the Amaxosa and some Bechuanas are very fond of monkey flesh.

It is an old accepted fact that Cysticercus cellulosae does, with varying incidence, occur in the dog. No doubt the incidence of infection with Taenia solium among humans, as the result of eating dogs' flesh only occurs in eastern countries, but universally dogs are susceptible to infection with Cysticercus cellulosae as the result of ingestion of human excretum containing ova of T. solium. As far as is known only two cases of canine cysticercosis have been observed in South Africa. Two brains of dogs suspected of rabies were found at the Onderstepoort Laboratory to contain many C. cellulosae. These brains were forwarded by Field Veterinary Officers to be examined for rabies, but both were negative for that disease.

Interesting statistics may have been brought to light if it had been possible to hold autopsies on all dead roaming dogs, especially the so-called "Kaffir dog" variety and scavenging and marauding farm dogs. It obviously does not follow that because in countries where dogs' flesh is not eaten, and man will not contract Taenia solium from that source, the converse infection of the dog with C. cellulosae, through eating infected human excretum may not result. Walker's remarks, therefore, regarding the possible fairly high incidence of cysticercosis among monkeys are equally applicable to dogs, if a thorough survey could be made in parts of Europe and America, Asia and Africa, Continents in which T. solium is still fairly common.

It is quite possible that the early Phoenicians, who ate no pork, but were very fond of dogs' flesh, may have contracted Taenia solium from measly dogs' meat.
Poisson (1930) recorded a case of C. cellulosae in a dog in Madagascar.

Undoubtedly, clinical symptoms are more apparent in dogs than in pgs, and cases resembling human cysticercosis, with its accompanying cerebral, nervous and ocular symptoms have been redorded by a number of writers. The main reason for this may be attributed to the fact that in general only such dogs which have shown rabid-like signs, epileptiform symptoms, blindness, etc., have been autopsied, and for every one of those cases, many hundreds of cases of ordinary intra-muscular cysticercosis may have passed unobserved, that is, the dogs have eventually died natural deaths and been buried or discarded into the rubbish bin, without further examination. On the other hand, in cases which have definitely been autopsied, cysts have most commonly been found in the brain in dogs, and less frequently in the conjunctiva, in the eyeball, sub-retinal, and in the general intra-muscular tissue. From cases actually observed, the brain may, therefore, be cited as a "predilection site" in the dog.

Among many others, Ball and Marotel (1903), Lesbre (1882), Repiquet and Salvatori (1906) and van der Slooten (1892) recorded cases of canine cerebral cysticercosis. Rivolta (1865) found cerebral cysticercosis in a dog which died suddenly from epilepsy, without having shown any evidence of previous illness.

Vogel (1870) autopsied and found Cysticerci cellulosae in the eyes of a dog which had gone blind.
Siedamgrotsky (1871) recorded a case which was suddenly seized with cramps and convulsions, especially of the jaws; "then it had fever, prostration, accompanied by vertigo and delirium, and death occurred during the day; 23 cysticerci were found lodged in the superficial part of the two cerebral hemispheres; nothing abnormal was observed elsewhere." Lesbre (1882) described a case in which the dog had been paralysed for two days, but for a long time previously it had "grinding of the teeth, was excited, and had attacks of vertigo." On post-mortem 30 to 40 Cysticerci cellulosae were found in different parts of the brain.

Generalized intra-muscular cysticercosis was described by Dufour and Gagon (1889), who found cysticerci in the neck muscles, the tongue, the general musculature, the heart and the lungs. Leblanc and Megnin (1873) found cysticerci in the neck, the liver and the pancreas. Suffran (1900) found a number of small swellings in the skin of a four years old fox-terrier dog. On microscopic examination the swellings proved to be C.cellulosae. Trasbot and Railliet (1887) examined numerous canine cysticerci and found that they were identical with those of pigs. They confirmed the fact that dogs were hosts of Cysticercus cellulosae.

Most recent reports of cases of canine cysticercosis cellulosae

originate from Asia.

Rao (1933) writes that C.cellulosae occurs in the pig and in the dog in the Madras Presidency of India.

Meyer (1933) records that dogs are frequently used as food animals in the Bataklands, Residency Tapanoeli, Dutch East Indies. In the Sub-Division of Toba dogs are slaughtered in the abattoir and the flesh is sold in bazaars. Whilst inspecting dog carcasses for Trichinella, Meyer found Cysticerci cellulosae in a dog. The cysts were mainly in the heart muscles and had the same appearance as those in pigs. Later he found four more cases. He points out that in that part of the Dutch East Indies dogs eat human excretum as readily as pigs do.

Bergeon (1928) reports cases of cysticercosis in dogs in Hanoi (Tonkin). In 1919 he first discovered cysticerci to be the cause of rabid-like symptoms in a ten years old dog. After that he caused all dog carcasses to be examined in their "Section", and found 138 cases of Cysticercus cellulosae between 1919 and 1924. Bergeon accounts for the high incidence of canine cysticercosis by the frequency of taeniasis among the Tonkinese. The natives are readily infected with Taenia solium owing to their habit of eating almost raw dogs' flesh, which has been lightly smoked over a straw fire. All Bergeon's cases were C.cellulosae and no case of C.bovis was found in dogs, although T.saginata is relatively common among the natives. Bergeon recommends that meat inspectors in the Far East should carry out systematic inspections of all dog carcasses slaughtered.

C.

INFESTATION OF THE BOVINE WITH CYSTICERCUS BOVIS.

As far as scientific investigations have gone, the Cysticercus bovis has only been found in the bovine and, very rarely, in man. Older writers have recorded measles resembling, as they thought, C.bovis in antelopes, deer, etc., but they were probably mistaken, and very likely the cysticerci they encountered were armed forms, e.g. the Cysticercus cervi in deer, or kindred forms.

Practically and scientifically we may, therefore, regard the bovine as the only domesticated animal which harbours the intermediate stage of the Taenia saginata.

Infestation in the adult bovine is usually of a very light nature. Most observers, throughout the world, have in routine inspections encountered but a few cysts in infected carcasses, or in the usual inspection incisions, and, exceptionally cases of gross or light generalized infestation have been met with. The present author has never yet come across a case in which infestation in any way resembled, in severity, that of a grossly infested pig carcass with C.cellulosae. Neumann, however, quotes J.Fleming, who counted 300 living cysticerci in a pound of psoas muscle.

PREDILECTION SITES.

Owing to the nature of bovine infestation, it is justifiable to regard certain locations as "predilection sites". It is quite impossible to incise a bovine carcass at random, and, for that reason Regulations lay down certain incisions in which cysticerci are frequently found. The incisions are to be made into muscle groups where as little mutilation of the carcass, as possible, will result.

Between May 1st 1936 and January 31st 1937, twenty-five bovine carcasses were totally condemned at the Bloemfontein abattoir. By minutely dissecting these carcasses, an opportunity was afforded to study the predilection sites, especially in those portions of the carcass which usually escape incision. These operations entailed a good deal of time and work, but it was felt that a true and representative survey of the most common sites of infestation could only be made by carving a series of condemned carcasses into as thin slices as possible.

It is admitted that a more comprehensive idea and summary would be formed only after about a hundred or more carcasses are so treated, but, on the other hand the ratio of light infestation to heavy infestation in South Africa is about 10: 1, and grossly measled material in an abattoir of the size of this, is relatively scarce. In addition to the observations in the 25 heavily infested carcasses, records were made in 113 consecutive lightly infested carcasses.

Le Coultre, during his observations in Bali in 1927, was afforded the unique opportunity of boning every infected carcass, and thus studying predilection sites. Under European conditions we are precluded from emulating Le Coultre's investigations.

A fairly comprehensive idea of the most commonly infested muscle groups may be obtained by reference to the subjoined table, which shows the number of measles which we found in each group, in 25 carcasses at Bloemfontein.

NUMBER	TOTAL MEASLES	(1) EXTERNAL MASTICATORY	(2) INTERNAL MASTICATORY	(3) TONGUE	(4) OESOPHAGUS	(5) HEART	(6) DIAPHRAM	(7) STERNAL MUSCLES	(8) EXT. THORAC AND INTERCOST	(9) CERVICALS AND HUMP	(10) EXT. MUSCLES OF VERTEBRAE	(11) SHOULDERS AND ELBOW	(12) EXTENSORS AND FLEXORS OF CARPUS	(13) PSOAS	(14) HIND LIMBS
	30	3	2				1		2	5	3	6			8
	31	4	1			1				3	4	6	1	2	9
	33		1	2		1					5	8	2		14
	91	12	3		2		2		6	5	8	22	4	1	26
	47	7	4	1					3	2	4	16			10
	38	11	3						5			8	3		8
	73	6		9		2				16		22	4		14
	19	3	1			1		3			2	4			5
	24	7								3	4	3		2	5
	42	6	2		1			1	2		2	9	3		16
	328	29	3	12	22	7	12			15	7	101	16	12	92
	64	16	3					7	2	5		17			14
	21	3	2		1	1			1	2		7			4
	29	9	1	4				1				12			2
15	44	7		2		2			1	5	3	16			8
16	40	5	2	1			1	2		3	2	8		2	14
17	49	3							2	4	2	23	2		13
18	105	17	3		2	3	2		6	9	5	27			31
19	37	6	2	1		1		2	3	5		8	6		3
20	73	13						4		7		31	2		16
21	70	6	3							3	7	19		4	28
22	44	7	2					1		1	2	14	1		16
23	83	3	2			2				3	8	26		2	39
24	53	13	1							1	1	7	11		19
25	28	3	3							1	3	2	3	1	12
	1496	199	44	32	28	21	18	21	33	98	72	422	58	26	426

Judging from the foregoing table, in 25 heavily infested carcasses, it would appear that the hind limbs harbour the most parasites.

Out of a total of 1,498 measles found in the 25 animals:-

(14) 426 measles were found in the hind limbs in 25 animals.
(11) 422 " " " " " shoulder and elbow in 25 animals.
199 " " " " " external masticatory muscles in 24 "
(9) 98 " " " " " cervicals and hump in 20 animals.
(10) 72 " " " " " external vertebrals etc. in 18 "
58 " " " " " extensors and flexors of carpus in 13"
44 " " " " " internal masticatory muscles in 20 "
(8) 33 " " " " " external thoracic & intercostals in 11
32 " " " " tongue and its muscles in 8 animals.
28 " " " " " oesophagus & its muscles in 5 "
26 " " " " " psoas muscles in 8 animals.
21 " " " " " heart in 10 animals.
(7) 21 " " " " " sternal muscles in 8 animals.
18 " " " " " diaphragm in 5 animals.

) Sternal muscles group included superficial and deep pectorals.

(8) External Thoracic and Intercostal group included Posterior deep pectoral, Latissimus dorsi, Serratus ventralis, External abdominal oblique, and Intercostals proper.

(9) Cervicals and Hump group included Trapezius, Omo-transversarius Upper Brachio-cephalic, Rhomboideus.

(10) External vertebral muscles group included Serratus dorsalis, Longissimus costarum, Longissimus dorsi.

(11) Shoulder and Elbow group included all muscles on the lateral and medial aspect of the shoulder and humerus up to elbow.

(12) Extensors and Flexors of Carpus group included Extensor cappi radialis, Extensor digitalis communis, and lateral and medial Digital extensor, and Superficial and deep digital flexors. - all from elbow to carpus.

(4) In this group were included all muscles of the hind limbs.

In two cases the total number of 433 measles was found, that is, 328 in one carcass and 105 in the other. A more represntative average would be arrived at by subtracting the 433 measles from the total of 1498, thus giving 1,065 measles in 23 carcasses, an average of 46.3 per carcass.

It will be noticed that cysticerci were found in the shoulder and elbow and in the thigh muscles of all 25 cases. In 24 out of the 25 cases measles were found in the external masticatory muscles. The fact that less than half the number of measles was found in this group compared with the shoulder and the thigh, may be ascribed to the fact that in the latter pairs very large groups of muscles were dissected, whereas the sedtions of the masseters were considerably smaller. Statistics such as those shown in the table may, therefore, be misleading. I quite agree that the group of muscles known as the masticatory (internal and external) must certainly be considered as a most important predilection site, and in Bloemfontein it was extremely rare that no measles were found in this group in an otherwise measly carcass.

The analysis formed by our careful dissection has brought to light the fact that the hind quarters of beef are as important from the point of view of measles location, as the fore quarters.

It is quite possible that numerous measly carcasses may escape detection because no provision is made in Regulations for the incising of any part of the hind quarter, except the psoas muscles, which, as our table shows, cannot be considered a very important predilection site.

In view of the comparatively frequent and heavy nature of infestation of the hind limbs, it was further decided to record the actual groups of muscles of the hind limb, in which measles were found, in the last six carcasses we dissected. The following was our recording:-

Carcass No. 20 :- Sixteen measles in both hind limbs. Muscles
Semimembranosus 4 measles;
Biceps femoris, lateral vastus, semitendinosus 8 measles.
Adductors 4 measles.

Carcass No. 21 :- Twenty-eight measles in both hind limbs.
Gracilis, Adductors and vastus medialis group 12 measles.
Semimembranosus 1 measle.
Semitendinosus 5 measles.
Biceps femoris and lateral vastus 10 measles.

Carcass No. 22 :- Sixteen measles in both hind limbs.
Gracilis and medial vastus 5 measles.
Vastus lateralis 2 measles.
Rectus femoris 1 measle,
Semitendinosus 4 measles.
Adductors 4 measles.

Carcass No. 23 :- Thirty-nine measles in both hind limbs.
Vastus medialis, Pectineus and Quadratus femoris 21 measles.
Biceps femoris, Lateral vastus and Semitendinosus 9 measles. Adductors 9 measles.

Carcass No. 24 :- Nineteen measles in both hind limbs.
Gluteus medialis 3 measles.
Gracilis and adductors 5 measles.

Carcass No. 24 :- (continued) Semitendinosus 5 measles.
Gastrocnemius (fleshy belly of lateral head) 4 measles.

Carcass No. 25 :- Twelve measles in both hind limbs.
Medial vastus 3 measles.
Biceps femoris, rectus femoris, vastus lateralis 7 measles.
Adductors 2 measles.

It will be noticed that measles were found in the adductors of all six carcasses (twelve hind quarters) observed. It must be emphasised that the adductors and most of the other large muscles on the medial aspect of the thigh should be considered very important locations for Cysticerci bovis. The large muscle groups on the lateral and posterior aspects of the pelvic limb are also important sites, but it would be impracticable to incise into them in ordinary meat inspection, without grossly mutilating the carcass. On the other hand the writer found that an incision parallel to and about an inch below the pelvic symphysis, deeply into the adductor muscle, did no material damage to the appearance of the quarter. The incision coincides, more or less, with those which butchers make in their shops in cutting up the steaks. The opinion of one of the local butchers was asked as to objections which might be raised against possible mutilation of the quarter by the making of such an incision, and he replied naively : " We will not object to the cut being made, but will be very annoyed if that will lead to your finding more measles." Practically, the incision is best made while the carcass is still on the floor, just after the abdomen has been opened and the pelvis cleft. If the incision is to be made after the carcass has been hoisted, meat inspectors will have to stand on

ladders. When made on the ground, the cut surfaces gape open, but when the carcass is hoisted, it is difficult to see into the cut, and a hook is required to pull the two surfaces apart. Several measles were found in an incision about an inch below the pelvic symphysis into the adductors, in carcass No. 23, described above.

In the subjoined observations of various workers, it will be noticed that very few writers in Europe mention incisions into the shoulder-elbow muscles or the thighs. Two notable exceptions are Buri and Krupski, who worked in Switzerland during the Great War period.

There can be little doubt that the recorded incidence of bovine cysticercosis will become considerably higher, if our co-workers in Europe were to incise into, e.g. the triceps brachii and the adductor.

Working on Bali Island, Le Coultre found 1,337 measly carcasses. He divided these into three groups:-

1. Cysticerci in head only, in 838 cases.
2. Cysticerci in head and carcass, in 300 cases.
3. Cysticerci in carcass only, in 199 cases.

If Le Coultre had followed the custom of inspection of Holland and of Germany, he would have missed the 199 measly cases entirely.

It will also be noticed that those writers, who were probably privileged to dissect the entire carcasses, chiefly refer to the muscles of the hind limbs and/or those of the fore limbs as predilection sites. (See Hammer, Teppaz, Valade, Claverie, Alix, Le Coultre, Morot).

Von Ostertag's expression "the more you look, the more you will find" is very applicable to the meat inspector's search for Cysticercus bovis. The inspector's permitted range of incisions is too limited, and although it may be felt that in the standardized routine incisions prescribed in South Africa, he will probably encounter most measles, the possibility of undetected measles in the not incised hind limbs must not be overlooked.

Reference to our table also discloses the frequency with which measles were found in the vertebral muscles and in the extensors and flexors of the carpus.

It is interesting to record that in none of the 25 observed cases did we find measles in any of the viscera (except the heart), nor in any glands. No measles were observed in the fat in these cases, nor in the brain, nor the eyeball.

The hump is very definitely a very common site for measles.

Exceptionally unusual infestations with measles have been encountered in South Africa.

In 1935 we found more than 50 apparently viable measles in the tongue of an ox, and yet we failed to disclose a single measle in any of the secondary incisions prescribed by Regulations. (This carcass was not minutely dissected).

Mr. Thatcher, Health Inspector, Fort Beaufort writes:-
"I have specimens of measles found in bovines in the kidney, submaxillary and inguinal lymphatic glands, hard fat of the heart and in some instances in other hard and soft fats of cattle."

The Town Clerk, Kimberley, advised me that in one case they

found measles in the lungs of an ox.

Mr. W.J.Armstrong, Meat Inspector, Vryheid writes:-
"I would say the tongue is the commonest site. I had a peculiar experience about a year ago. While the animal was being skinned, I noticed measles lying on the surface side of the shoulder, and when I did the shoulder cut nothing was to be found, but found the head, tongue and heart heavily infested."

It has been mentioned that we also studied the predilection sites in 113 consecutive lightly infested carcasses. It was impossible to dissect those carcasses minutely, since, in accordance with Paragraph 16(2) and (3) of Section 115 of Act No. 36 of 1919, as amended by various Government Notices, they were subjected to fourteen days freezing at -10°C. We had, therefore, to accept the number of cysts found in the routine and secondary incisions as indicative of the commonest sites of infection.

Except in one case, in which a viable cysticercus was found in the M.Semitendinosus, no incisions were made into the hind limb. The measle found in the semitendinosus muscle was encountered purely accidentally. A small piece of this muscle had to be excised from the quarter on account of bruising, and to our utter astonishment we found a viable Cysticercus bovis exposed. Not a single measle was found in any of the secondary incisions which were subsequently made. This was another instance in which coincidence fortunately stopped a measly carcass from being passed as fit for human consumption.

In recording the sites of infection in the 113 lightly infested carcasses, we found:-

Measles in the masticatory muscles only, in						40	cases,
" " " " " plus shoulder, plus tongue in						5	"
" " " " " " " " heart "						2	"
" " " " " " " " psoas "						1	"
" " " " " " shoulder, only, in						35	"
" " " " " " psoas, only, in....						1	"
" " " " " " diaphragm, plus sternum "						1	"
" " " " " " " " shoulder"						1	"
" " " " " " sternum (brisket) only, "						1	"
" " " " " " heart in						2	"
" " " " " " tongue in						5	"
" " " Shoulder " " only in						10	"
" " " " " plus tongue in						5	"
" " " " " " psoas "						1.	"
" " " " " " sternum (brisket) in						1	"
" " " Tongue plus the heart in						1	"
" " " Semitendinosus muscle only, in						1	"

Analysing the actual number of measles found, and the various number of cases, we found in the 113 carcasses:-

In the masticatory muscles in.....	94 cases.....	129	measles.
" " muscles of the shoulder above elbow	61 "	113	"
" " tongue.....	16 "	17	"
" " heart.....	5 "	6	"
" " psoas muscles	3 "	3	"
" " sternal muscles (brisket)	3 "	3	"
" " diaphragm.....	2 "	2	"
" " semitendinosus muscle	1 "	1	"

Thus in 113 lightly infested carcasses we found 274 measles. Of the 129 measles found in the masticatory muscles, 98 were found in the external masticatory muscles and 31 in the internal masticatory muscles.

The ratio of light infestation to heavy infestation is reflected in the following statistics:-

From July 1st, 1934 till December 31st, 1936, 1,060 bovine carcasses were found to be measly at the Bloemfontein abattoir.

Of this number 953 carcasses were lightly infested, that is, they were treated in the freezing chamber according to Regulations, and 107 were grossly infested, that is more than six measles were found in the incisions into the carcass, excluding the head and the viscera, or a total of ten measles in the carcass, including the head and the viscera.

Mode of Inspection.

Regulations governing the inspection of carcasses for measles were discussed earlier in Part III of this work, in the section dealing with the routine inspection of pig carcasses. For the inspection of bovine carcasses, the routine is the same as that of pig carcasses, except that the following provisions are specifically made:-

Paragraph 13(a) includes a clause which lays down that the cheek muscles of bovines shall be examined by two or more linear incisions on the outside and a linear incision on the inside, which shall all be made parallel to the lower jaw.

The meat inspector is not authorized to make a routine incision into the substance of the tongue, unless he has found evidence of measles in the routine incisions, nor is he allowed to make any inspection incisions, other than those for the examination of the lymphatic glands, into the pelvic limb.

VARIOUS AUTHORS ON PREDILECTION SITES AND INSPECTION TECHNIQUE.

Up till 1888 very little was known of beef measles in Europe, and between the years 1883 and 1889 only four cases of bovine

cysticercosis were found at the Berlin abattoir. About that time Hertwig recommended that the muscles of the pharynx should be incised for the examination for rinderpest, and this led to incisions into the internal masticatory muscles. A number of measles was thus found. The method was further improved by Glagé, who incised the external masticatory muscles and found still more measles in those muscles. This led to the first "predilection sites" discovered, as van Oijen (1929) suggests, "by pure accident." Further observations led to the discovery of yet other "predilection sites", for example, the heart, the tongue and later the neck muscles.

Von Ostertag (1913) gives the following table showing the frequency with which beef measles were found between 1888-90 at the Berlin abattoir:-

1. In the masticatory muscles ..... in 360 cases.
2. In the heart..... in 41 cases.
3. In the tongue ..... in 10 cases.
4. In the thoracic muscles ..... in 1 case.
5. In the cervical muscles ..... in 3 cases
6. In the general musculature..... in 22 cases.

He mentions that with the exception of the heart, the vital organs of cattle are not usually infested with cysticerci. Only in cases of extensive invasions are the lymphatic glands, lungs liver and brain infested.

Von Ostertag quotes Morot, who found in an African beef animal that the internal masticatory muscles were less strongly infested than the tongue and the heart. Cysticerci were also found in large numbers in the muscles of the shoulder, fore leg,

back, rump and hind quarter. (Cf. table of infestation in the 25 cases dissected at Bloemfontein.)

Flohil (1910) quotes Beunders, who found at the Groningen (Holland) abattoir the following order of frequency of infection:- 1. Heart; 2. Internal masticatory muscles; 3. External masticatory muscles; 4. Tongue; 5. Diaphragm.

Le Coultre, during his investigations in Bali in 1927, had the opportunity to dissect all infected bovine carcasses. Le Coultre had, therefore, the privilege to compile a very accurate estimate of the predilection sites from actual observations of a number of carcasses. At the abattoirs at Boeleleng and at Denpasar the combined number of measly carcasses during 1927 was 937 out of a total of 3,810 slaughtered during that year.

Measles were found:-

In the masticatory muscles.....	in	778 cases	(83%)
In the tongue.....in		131 cases	(14%)
In the shoulder muscles.....	in	114 cases	(12%)
In the adductors.....	in	109 cases	(11.6%)
In the cervicals	in	70 cases	(7.5%)
In the intercostal muscles	in	45 cases	(4.8%)
In the psoas muscles	in	42 cases	(4.5%)
In the infra-vertebral muscles..	in	36 cases	(3.8%)
In the sternal muscles.....	in	24 cases	(2.6%)
In the diaphragm	in	19 cases	(2.0%)
In the abdominal muscles.....	in	17 cases	(1.8%)
In the heart.....	in	14 cases	(1.5%)

He also found 5 cases with measles in the oesophagus, 4 in the hump, 1 each below the elbow and the patella, 1 in the brain and 1 in the kidney.

Alix (1887), working in Tunis, found the following order of frequency of infection:- Tongue, heart, muscles of the thigh, muscles of the shoulder, croup, intercostals, pectorals and psoas.

Hammer wrote in 1922 that in former German East Africa he found the most important predilection sites to be:- The adductors, the muscles of the neck, the tongue and lastly the heart. Hammer was privileged to incise other parts of the carcass than those prescribed in customary European inspection technique. According to Capt. H.J.Lowe, M.R.C.VSS., of the Department of Veterinary Science and Animal Husbandry, Tanganyika, who wrote to me in 1936, the chief predilection sites in Tanganyika at present are:- (1) The heart muscle.(2) The muscular mass of the upper part of the hind leg, i.e. Biceps femoris and Semitendinosus and also the Triceps of the arm. (3) The tongue (4) The masseters.

Teppaz (1923) working in Dakar (Senegal) found the following order of frequency:- Cervical muscles, masticatory muscles, heart, diaphragm and adductors.

Vallade (1927) gave the following order of frequency as representative of his observations at Homs (Syria) :- Diaphragm, heart, psoas muscles, masseters, adductors and cervicals.

Claverie (1928) found the anconeus muscle the most frequent site of infestation in French Guinea. It is difficult to understand how he incised the anconei and found more measles there, than in the larger superlying triceps muscles, in which group measles are, defintely, very frequently found. Claverie's custom was to make two incisions into the anconeus muscle on each side.

Prof. S.Yoshida of the Osaka Imperial University, Osaka, Japan, supplied a translation of a recent paper written by Nakanishi, who found the following order of infestation in Korea:- Heart muscle 75% of cases; trunk muscles 47.7% of cases; tongue 30.0 % of cases; Masticatory muscles 23.5% of cases; diaphragm 20.3% of cases; lungs 19?7% of cases; cutaneous muscles 18.9% of cases; retina 10.5% of cases; pericardial sac 9.1% of cases; gastric wall 8.5% of cases; lymph glands 6.5% of cases; oesophagus 5.2% of cases; kidneys 5.2% of cases; pancreas 3.9% of cases; bladder 3.3% of cases.
Nakanishi, therefore, gives a totally different order of infestation, and he found the masticatory muscles to be, relatively, of much less importance as a predilection site, than most European writers. The comparatively high percentage of cases with pulmonary, retinal and lymph glandular cysticercosis is also worthy of note.

Ransom (1911) described the predilection sites observed in the United States as:- Heart 70%, masticatory muscles 47% of cases. Dr Mohler, Chief of the Bureau of Animal Industry, United States Department of Agriculture informed me that the most prevalent seats of infection in the United States at the present time are:- (1) The muscles of mastication. (2) The heart. (3) The muscular portion of the diaphragm.

Veenstra (1921) found the following order of frequency at Amsterdam:- Out of 26 single measled cattle he found the external masticatory muscles infested 16 times, the heart 5 times, the

Funck (1930) pointed out that next to the masticatory muscles the oesophagus is the most common site of infestation. During four years' observation at Neumunster, out of 120 adult bovines with live cysticerci , he found:- 105 cases of measles in the masticatory muscles, 13 cases in the oesophagus, 5 cases in the heart, 5 cases in the abdominal muscles and one case in the diaphragm. Cysticerci thus appeared in the oesophagus in 10.3% of cases, and in all these 13 cases only one live measle was found in the whole carcass. In 1935 Funck recorded that in five cases he found measles to be extremely shallow in various facial muscles, the lips, etc., and not necessarily in the usual sites. Funck advised that these superficial muscles should receive careful attention. He also maintained that all ox heads should be examined on a table, so that the light could be shome more readily into the cheek cuts.

Cattoneo (1932) also found that the oesophagus could be considered an important predilection site of C. bovis. Out of 40 cases investigated, he found measles in the oesophagus in 17 cases.

Messner (1931) described a case of a 6 years old ox in which a number of cysticerci was found in the oesophagus only, in Karlsbad.

Coussi (1933) found at the abattoirs at Sousse (Tunis) that the heart was the most common site to be infested, during 5 years' close examination. Out of 621 animals infected 524, i.e. 84.37% showed cardiac cysticerci; 318, i.e. 51.2% showed measles

in the masseters; and 260, i.e. 42.19% in the tongue.

Krueger (1935) found the predilection sites to be, in order of frequency:- Masseters, tongue, diaphragm and heart. The heart was infested in only 10% of cases.

Stengel (1932) advocated opening the pericardium in each carcass, since he frequently found measles just below the pericardium.

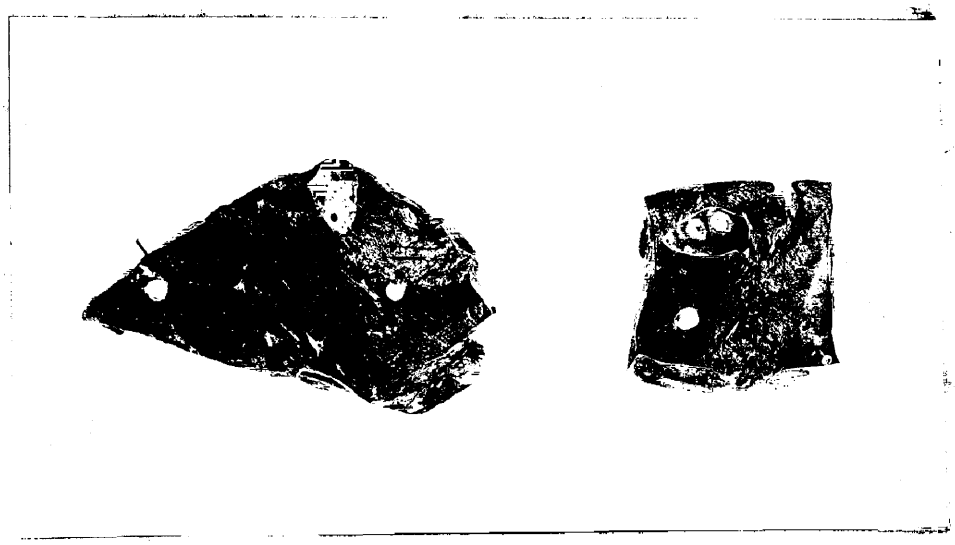
The necessity for careful inspection of the liver for cysticerci has recently been mentioned by Poisson (1934), by Buck, Lamberton and Randriambeloma (1935) and previously by Schlegel (1918). Poisson records a case of infection with Taenia saginata in a patient in Madagascar, as the result of the ingestion of a prescribed raw liver diet. Buck and his co-workers found two C. bovis in the liver of a cow. Schlegel found a C. bovis in the liver of a cow. It was the only measle found in the carcass.

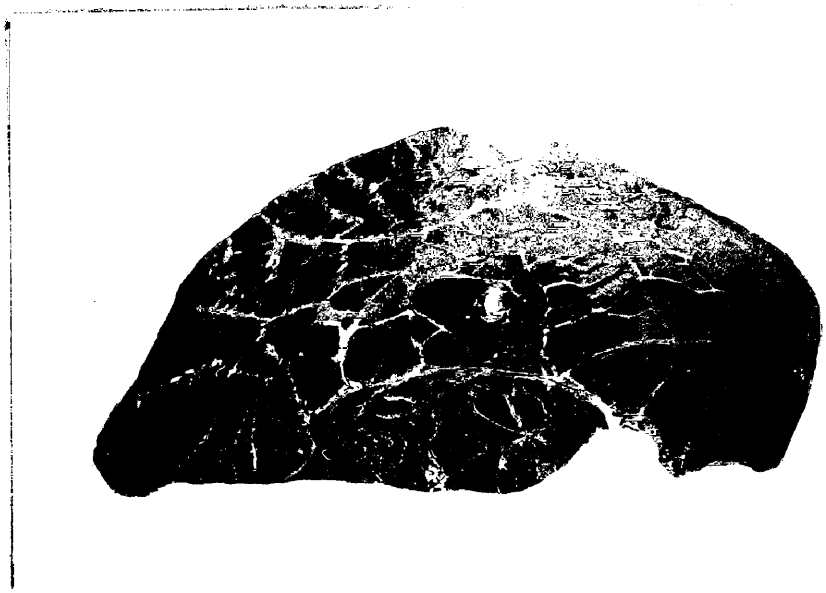
Professor P.G. Malkani supplied me with photographs of cysticerci in the heart, liver and lung of a bovine in India. (See appendix).

Mahlendorff (1929) names a case in which he found a C. bovis in the subcutaneous fascia and in one kidney, while the usual predilection sites were quite free.

Remarks on Inspection Technique and Recommendations by some writers.

Many recent workers in Europe have stressed the point that





Appendix "A". Photographs of Cysticerci bovis of the heart, liver and lung of an ox. Reproductions of photographs supplied by Prof. P.G.Malkani, Patna, India.

meat inspectors should be allowed greater authority and more liberty for inspection. For example, in 1932 B. Müller suggested the standardization of inspection technique in Germany, by making two incisions into each masseter. The masseters are considered the most probable site of infection by workers in Europe, and many consider that by increasing the number of masseteric incisions, a very much larger percentage of measles will be found, and that there will be a corresponding impetus towards the eventual eradication of bovine cysticercosis. Among these writers mention may be made of Künibert Müller, quoted by Le Coultre, who in 1905 recommended that the external masticatory muscles should be incised onto the crysta zygomatica, and the flaps formed turned right back. By this means Müller found 4.6% infected at Guben, and Junack 2% in Kottbus.

K. Müller (1927) recommended doubling the number of incisions into the masticatory muscles. He also advised making incisions into the muscles under the tongue. All incisions should be examined very carefully, and only sharp, firm knives should be used. To ensure efficiency, not more than 50 to 60 bovines should be inspected by one inspector per day.

Mahlendorff (1930) found 0.81% to 0.91% measles in cases where one cut was made, and 1.06% to 1.54% in cases where more than one cut were made. Mahlendorff mentioned that prior to June 1929 only one incision was made into each masseter at Breslau. In April 1929 he found 0.81% infected, and in May 0.94%. In June that year he made two incisions into each masseter and

found in:- June 1.11% ; July 1.38% ; August 1.06% ; September 1.11 % ; October 1.53% ; November 1.54% ; December 1.22% ; and in 1930 in January 1.42% ; February 1.35% ; March 1.08% .

Kern (1930) expressed the opinion that the problem of eradication of Taenia saginata could be solved by thorough inspection technique. He always insisted on two incisions into the external masticatory muscles, and if possible into the internal masticatory muscles as well.

In Zeitschr. f. Fl.- und Milchhyg. 40 p. 386, von Ostertag (1930) recommends a double incision of the masticatory muscles, and if necessary, even transverse cuts, when many more measles will be found.

Platschek (1931) recommended three or even four incisions into each masseter. Similar recommendations were made that year by Wernery, who advised that the number of incisions in the external masticatory muscles be increased from two to three on each side.

The new inspection technique in Germany, since October 13th 1934, provides, according to personal information supplied by Dr. Heinrich Wagemann: "A careful inspection of the tongue, heart and external and internal masticatory muscles. At least two incisions must be made parallel to the mandible , and while the carcass is being dressed, cut surfaces must be inspected for measles. The incisions into the masticatory muscles must be made from the

border of the mandible to the upper half of the inside of the jaw, and as far as it can be cut into, upwards to the lymphatic glands of the ear on the outside of the jaw."

All German writers, however, do not necessarily hope that a greater number of incisions into the masseters will be the main solution to the taeniasis problem. Several writers stress the fact that the low incidence recorded at certain abattoirs is mainly due to slackness in inspection technique. Among these Junack was a leader. Junack (1926) formed the following conclusions: "The apparent big decrease in the incidence of cysticercosis in some areas may be attributed to careless inspection during and after the war, owing to shortage of staff, or owing to various modifications in inspection, or owing to removal of cysticerci, surreptitiously, by butchers themselves. Other local difficulties may also be responsible." In support of his statements, Junack quotes:-
"The incidence of measles in Berlin was 22 times as high as that of the outlying areas (Auszenbezirke), whereas actually the slaughter stock came from the same regions." Furthermore, according to Junack, in 1923 and 1924, 101 measly cattle were found at Bremen, whereas not a single case was found at Mecklenburg Strelitz, Schaumburg Lippe and Hohenzollern. In 1931 Junack wrote that during the war meat inspection was not too thorough, and it was possible that in some places where troops served it might have been absent altogether. Under such conditions soldiers acquired tapeworm infection and later, in turn

infected German cattle with C. bovis. Owing to closer meat inspection more cases of C. bovis have been found, but in Junack's opinion, yearly 5,000 to 6,000 more cases may be found, if inspection technique were still more thorough.

Similar views were expressed by Profé (1934), who pointed out that it was difficult to compare the incidence of C. bovis in various places, because there was a big variance in the thoroughness of meat inspection.

In addition to advising uniformity in inspection technique, Zeug (1931) mentioned that the number of incisions required, and their locations, should be definitely stipulated in Regulations. That the human element was an important factor in the discovery of cysticerci was clearly shown by Zeug. Thus, there was a big variation in the efficiency of the work performed, comparatively, in the following groups of inspectors:-

(1) The number or percentage of full-time abattoir veterinarians who found measles.

(2) The number or percentage of veterinary practitioners, who spent a small part of their time at abattoirs, and who found measles.

(3) Unqualified assistant inspectors, who found measles.

Zeug qualified his remarks by giving actual statistics.

Wernery (1931) blamed perfunctory meat inspection for the failure to eradicate bovine cysticercosis. He mentioned several instances in which a much higher percentage measles was found after deeper and larger incisions of the masticatory muscles were made.

After having made only one incision into each masseter, Jüraske found only 0.16% of cases measly at the Jena abattoir, but when he increased his masseteric incisions to two on each side, Juraske found that the percentage increased to 1.29. (Wernery, 1931; von Ostertag, 1930).

Wernery recommended that the Regulations should lay down precisely, as to where and how incisions should be made, and mentioned that in certain parts of Prussia, where specific incisions were made, the percentage measles was much higher than in other districts.

Buri, working in Switzerland in 1914 and 1915, caused a big increase in the number of C. bovis carcasses to be found at the abattoir at Berne, when he incised the masticatory muscles freely. The result of his system of incisions was an increase in the number of cases from 1 and 5 in 1912 and 1913, respectively, to 23 and 39 in 1914 and 1915, respectively. Buri was convinced that nine-tenths of the cases of C. bovis found, resulted from the extra incisions into the masticatory muscles, and he persisted with this practice, despite the determined protests of the butchers. It was he, who in 1915 recommended that Switzerland should adopt the German method of inspection, since the incidence of C. bovis was high and warranted it.

Guillebeau (1917) objected to the severe German mode of nspection, and considered that this method was too rigid for witzerland, in which country raw, or insufficiently cooked meat was

seldom eaten, although he freely admitted that the incidence of taeniasis was high in those parts of Switzerland, where the so-called Landjäger was commonly eaten.

The same year, 1917, Krupski attacked the mild views expressed by Guillebeau, and proved that at Liestal he found a percentage of 5.9 in cases in which he freely incised the masticatory muscles. He was a staunch advocate for the introduction of the German method of inspection, into Switzerland. Krupski compared the great variation in inspection technique and mode of control of cysticercosis, as was practised at various Swiss centres. Thus he quotes:-

Zürich - only the predilection sites which could be inspected without incisions, and thus not the masticatory muscles, were inspected.

Basel - idem, and two masticatory muscles were incised.

Schaffhausen- idem, and besides an attempt was made to detect the responsible tapeworm carrier by investigations at the place of origin of the infected bovine.

StGallen- idem.

The American Edition (1934) of the work by Edelmann, Mohler and Eichhorn states that it is absolutely necessary to make several cuts into the inner and outer muscles of mastication, to inspect carefully the tongue and its musculature, and also to inspect carefully the heart, externally and internally, after laying open the chambers and cutting through the dividing wall. It is understood that all surfaces as well as cut surfaces of the remaining muscles should be inspected for beef measles.