

"TERTIARY SPECIFIC DISEASE OF THE LUNG:
AN ANALYSIS OF CASES HAVING SPECIAL
REFERENCE TO CLINICAL CHARACTERISTICS"

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HISTORICAL AND INTRODUCTORY.

That the adult lung may be the locus of pathological processes, solely the outcome of constitutional syphilis, has been maintained almost since the dissemination of the disease throughout Europe in the last decade of the fifteenth century.

It seems clear that syphilis did, at that time, display a distinct exacerbation, and the first declaration of opinion in regard to its possible effect on the lung, appears to have been made by Paracelsus early in the sixteenth century (quoted by Greer (46)) During this and the succeeding century, mention of such lung affection is not infrequent, and cases were described by Pare, Boerhaave, Astruc, Valsalva, Morgagni, and Morton. (70: 5: 95: 56: 97). Although of some historical interest, these must be regarded as, in the main, fanciful conceptions entirely lacking in precision and unfounded, on present standards, in any accurate anatomical research. Cases were seriously reported in which cessation of a urethral discharge was followed by "venereal phthisis", the latter to vanish on the re-appearance of discharge. In comparing the large number of cases reported in the years previous to 1800, with the general outlook at the end of the nineteenth century, Fournier speaks of "the/

"the credulity of our forefathers and the incredulity"
 "of our contemporaries."

Following the careful clinical studies of Laennec the outlook began, in the early nineteenth century, to undergo radical change; Laennec and Boyle, although admitting the occurrence of a syphilitic lung affection, denied emphatically the existence of any specific condition meriting the title "phthisis à lue venerea". In 1837, Graves (75), while denying also any such entity, taught that certain varieties of acute and chronic bronchitis were syphilitic in origin, and advocated, in their treatment, the use of mercury -
 - "under its use it is most pleasing to observe the "
 "speedy improvement in the patient's looks and symp- "
 "toms; the fever, night sweats, and watchfulness, "
 "diminish; he begins to get flesh and strength, and, "
 "with the symptoms of lues, the cough and pectoral "
 "affection disappear". In 1841, Munk, a pupil of Graves, described as syphilitic, cases of bronchitis, broncho-pneumonia, and lobar pneumonia with associated secondary manifestations, and stressed the value of iodide of potassium in treatment. With regard to destructive lesions - the syphilitic phthisis of former years - he indicates the general consensus of contemporary opinion - "in the present day there "
 "exists a pretty general disbelief of any particular "
 "power possessed by syphilis of giving rise to tuber-"
 cle/

"tubercle" (75). At the same time he admits the possible deleterious effect of syphilis in predisposing to, or in activating pre-existent tuberculosis.

The conception of a destructive syphilitic lesion of considerable frequency had now lost much favour, but the possibility of such a condition simulating pulmonary tubercle was widely appreciated; Stokes, in 1844, in describing cases of supposed phthisis, writes "see whether there is any syphilitic taint and if so" "examine for periostitis of the chest." Graves, in 1848, was accustomed to base his diagnosis in doubtful cases, on the result of anti-syphilitic treatment. An abstract of 1859 reads - "we have seen cases in " "the Royal Free Hospital wherein the evidences of " "phthisis were present, with an absence of the " "physical signs of the disease, the symptoms depend- " "ing upon constitutional syphilis and readily yield- " "ing to the exhibition of mercury" (78).

Up to this time no effective advance had been made in pathology, and, despite the pioneer work of Laennec, phthisis was not yet regarded as invariably tuberculous. As late as 1861, Aitken (1) described a considerable number of cases, many with post-mortem reports, which he regarded as syphilitic in origin. There is little doubt however, from a perusal of these, that Aitken, in company with his contemporaries, laboured under the severe handicap of inability to exclude/

exclude at post-mortem the possibility, indeed the probability, of tubercle. Nevertheless certain manifestations and clinical characteristics of pulmonary syphilis were appreciated; the discrepancy of signs and symptoms had been noted, the effect of potassium iodide and mercury observed, and the diagnostic value therein assessed, but the condition had as yet no secure foundation in pathological fact.

Depaul in 1853, and Virchow in 1858, published their papers on congenital syphilis. In 1862, Virchow had a case which clinically and later at autopsy, showed, in addition to tibial periostitis and subcutaneous gummata, lesions of pleurae and lungs. These pleural and pulmonary lesions, in association with typical constitutional syphilis, served to recall to Virchow a few instances of somewhat similar changes which he had noted in the lungs of syphilitic infants, and in this recollection was born the pathology of acquired syphilitic disease of the lung. His publication of these findings in an adult, the subject of syphilis, laid the first secure foundation for future pathological study and research on lung syphilis.

Virchow's work brought as its sequel, a host of published cases which sought to exemplify the effect on the lung of late syphilis. Unfortunately, prompted by association with manifest syphilitic lesions elsewhere/

elsewhere, all conditions from simple bronchitis to brown induration, abscess, gangrene, and cavity formation were ascribed to this disease, and many gross mis-interpretations were undoubtedly made - an untimely renaissance of the "venereal phthisis" of seventy years before, which continued, to reach a culmination in 1881, with the statement of Pancritius that pulmonary syphilis "decimates the flower of the land". Koch, by his monumental work on tubercle in 1875, made the first attempt to stem the tide; his discovery seven years later, of the tubercle bacillus, marked the turning point and at once the popularity of pulmonary syphilis ebbed fast.

Not all the contributions of this period can be categorized as valueless. Accurate observations were made, and useful data have been recorded, by Weber (117), Greenfield (44:45), Gowers (42), Green (43), Pye-Smith (88), Mahomed (72), Goodhart (41), Thornton (108), Ewart (28), Hutchinson (57), Kelly (60), and Moxon (74).

Following Koch's epoch making discovery of 1882, a marked diminution in the numbers of reported cases became at once evident, and, although the unbalanced enthusiasm of the two decades immediately preceding had given place to frank and even bitter scepticism, the problem of lung syphilis was now subjected to a more productive attitude of sane conservatism which accepted/

accepted its existence as proved, but continued to seek and define its various clinical manifestations and pathological types. Publication of clinical and post-mortem observations did not therefore cease, and the comparatively few records which now made their appearance were of infinitely greater value than the flood which inundated the literature between the landmarks raised by Virchow in 1858, and by Koch in 1882. Such were those of Rolleston (92), Satterthwaite (97), Councilman (19), Thompson (105), Straight (102) and Gemmell and Buchanan (37).

The multifarious lesions formerly designated by the title "syphilitic phthisis" now appeared but rarely and the majority of reported cases were of gummata. The few valuable contributions of former years seem rather to have fallen into obscurity, if not into disrepute, and the century drew to a close with the gumma enthroned as the syphilitic lesion "par excellence". With the seed sown by Koch now come to fruition, the field of pulmonary pathology and clinical work was given over to tubercle. Its wide, almost universal distribution among the adult population had been demonstrated; histological, cytological, and bacteriological criteria for its accurate diagnosis were established, serological methods were eagerly sought and it is little wonder, in the absence of parallel advances in the case of syphilis, that the knowledge/

knowledge so laboriously contributed to the subject of its pulmonary activities was, for the moment, lost sight of.

In the present century each decade has seen the subject receive additional impetus. Progress has not been made with the ill-timed precipitation which followed Virchow, nor has it been accomplished at the expense of tubercle, but rather have these two taken their proper places in the front line of those diseases whose salient is driven into the human lung. Tuberculosis is, without question, the more formidable and numerically strong, but it does not now hold the field to the total exclusion of syphilis.

The progress that has been made since 1900 is, at least in part, a reflection of the progress made in the knowledge of syphilis in general. The discovery of the *treponema pallidum*, the evolution of specific serum reactions, the discovery of Salvarsan and its derivatives, the tremendous advances in treatment, the use of X-Rays as a control on clinical improvement, and finally the histological researches of Warthin (113), have, each of them, marked a further step in the advancement of clinical and pathological knowledge of this disease. During this period many series and many single cases of pulmonary syphilis have /

have been recorded; in these, full use has been made of such added knowledge to arrive at an accurate diagnosis.

With this recently recorded material the writer is mainly concerned. The observation over a period of some years, in hospital, clinic, and general practice, of five cases of syphilis of the lung, has prompted a review of cases published during the past thirty years. It has not proved difficult to abstract from the literature the clinical reports of one hundred and twenty-eight cases. Among these, selection of cases - discrimination has unfortunately proved necessary - has been made with two main objects - authenticity and completeness. Many of the cases, though probably syphilitic, have shown some element of doubt which would militate against accuracy in any conclusions drawn from review of a series which included them; others have been rejected as being incomplete in more than detail. Thus fall eighty-seven cases.

Numbers have therefore been sacrificed, and what first appeared as an ambitious total has been whittled down to quite modest dimensions. The material lost thus - and much accurate observation has perforce been disregarded - is compensated by the knowledge that the final selection consists of cases which are fairly complete and which are, in the light of present knowledge/

knowledge, of unquestionable syphilitic origin. To this number - forty-one - are added five cases personally observed, the total of forty-six cases representing the sifted raw material upon which this paper is built up.

The group of cases thus collected has been analysed entirely from a clinical standpoint, and any usefulness which the results may have is applicable in this field only. No useful purpose can be served by the conduction, on a large scale, of banditry amongst the published pathological work, and the subsequent retail, entirely at second-hand, of the fruits of labour of others. No claim of originality is made for the substance or theme of the paper; series analysis of pulmonary syphilis has been done before and will be done again, but in the present group of cases, personal observation, too limited to be of statistical value, has served to dictate an exacting discrimination in the selection of further cases; the source of these has proved so prolific that it has been possible to build up a very considerable group of cases of undoubted credentials and it is, by their critical analysis, the purpose of this thesis to show the clinical characteristics of tertiary syphilitic lung disease in the adult.

The compass of the paper is indicated in the index/

index immediately following. Throughout the text, where reference could usefully be made to the observations and statements of others, this has been unhesitatingly done and duly acknowledged. Conclusions have been set out in summary form at the end of each section and are typed in red.

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FREQUENCY OF PULMONARY SYPHILIS.

A paper on visceral syphilis in an authoritative journal of 1909 yields the following - "syphilitic " "disease of the lung is so rare that it hardly enters" "in clinical medicine" (112). The provocation of this statement provides sufficient apology for the tedium of a consideration of the evidence which has been led in attempts to establish the true incidence of the condition.

The literature is replete with case reports of lung involvement in acquired syphilis. Unfortunately, the diagnosis in the majority must be regarded as a matter of opinion rather than of demonstration, and, on reviewing these, it becomes evident that "a statis-" "tical study of pulmonary syphilis is fraught with " "more than the ordinary dangers and fallacies" (56). Unanimity of opinion as to frequency is not a feature, the outstanding impression being one of sharp contrast - greater frequency of clinical diagnosis than of pathological confirmation.

One well known standard work states that "anatomically the disease is rare", and, "clinically " "the disease is rarely recognised" (81). Fowler, in a study of the pathological material of the London museums, found only ten specimens of which he was reasonably/

reasonably sure (32). Symmers, in a series of 4880 routine post-mortems, found visceral syphilis in three hundred and fourteen, with lesions of the respiratory tract in thirty-five, but pulmonary syphilis in twelve only (103). Howard, from the publications of the years 1922-23-24, accepted fifty-two cases, but himself saw only seven, in a total of 11,982 medical admissions; the number of cases showing visceral syphilis (central nervous system not included) was one hundred and thirty-nine; he concluded that the frequency of pulmonary syphilis was approximately one twentieth of the total visceral incidence, central nervous system excepted (56). Orsagh (80) quotes the experience of Schlesinger who, in much pathological and clinical material, saw only two proved cases of the disease, while according to Carrera (14), Baekok's series of six thousand post-mortem examinations yielded a like number. Stanley (100) found three cases - one of them doubtful - among one thousand notifications of tuberculosis, while Denman, dealing with 3,427 known syphilitics, found seventeen instances of involvement of the respiratory tract with lesions of the lung tissue proved only in four (21:22).

On such authority is the assertion of great rarity apparently well founded. But in medicine, as in other branches of science, continued and passive respect/

respect for the teaching of authority has definite limits of desirability - the heresy of M'Ewan led him to experiment with sharp and blunt separators and finally to put a period to the long accepted osteogenic function of periosteum. Similarly, in regard to pulmonary syphilis, dissentient voices have in recent years been raised.

Since 1917 some papers of more than passing interest have been published. These have had their genesis in the fact, readily conceded, that there is no "a priori" reason why syphilis should not, in its tertiary stage, attack the lung, and have sought to prove that the disease does indeed do so and with a frequency hitherto regarded as exaggerated and not supported by the known facts. Fresh evidence, both clinical and anatomical, has been thus brought forward. It is difficult to bestow the honours with equity, but there can be little doubt that chief importance attaches to the monumental researches of Warthin (113 - vide infra.) and Carrera (14). The latter, in a histological study of the lungs of one hundred and fifty-two known syphilitics, found specific lesions in twelve cases, while Tylecote (110) quotes the work of Petersen who, in eighty-eight syphilitic post-mortems, found pulmonary lesions in eleven. Munro (76) saw six cases of pulmonary syphilis among one hundred patients in Glenlomond Sanatorium; of his adult/

adult cases three certainly are acceptable. In a group of eighteen post-mortem examinations of syphilitic bodies, Bryce and Paterson (7) found pulmonary syphilitic lesions in all but three of the cases. They concluded, as do Cockerham (17), Weber (116), and Gibbs (38), that syphilitic changes in the lung are more frequent than was formerly believed. Tylecote (110) describes sixteen clinical examples, and makes the interesting observation that he has never attended a post-mortem which demonstrated the condition; he concludes that the condition is not a rare one and that any computation of its frequency, based upon pathological findings, is fallacious.

Such wide disparity of opinion can only be evaluated when the standard of post-mortem diagnosis is critically analysed. On the table, the presence or absence of syphilis can be ascertained only after the most severe and exacting examination. The researches of Warthin have shown clearly that the evidence must be not only consistent with the presence of syphilis but must be, at the same time, inconsistent with its absence (113).

The presence of syphilis may be inferred - often with considerable assurance - from gross appearances alone, but Warthin has demonstrated that its absence may be accepted only after negative bacteriological, histological, /

histological, and serological examination. The majority of pathological reports are here at variance, and show an incidence of syphilis considerably less than Warthin, as they have been content to prove syphilis by bacteriological and histological methods, only in the presence of suggestive gross lesions, while little use has been made in them of serological examination in the dead subject. With exclusion of syphilis not attained, the inevitable result has been that the common view of the visceral incidence of syphilis is a reflection of the frequency with which the gross lesions, particularly the gumma, are found in the various organs. The gumma has been elevated to undeservedly high office and if it is to be regarded as the ultimate proof of syphilis, then indeed, is the disease rare, not only in the lung but in the other viscera to varying degree. Only three of Carrera's twelve cases, and only six of Bryce and Paterson's fifteen, showed gummata (14:7.), while Gloyne, in seventeen years association with the work of Victoria Park Hospital, has never seen one (40).

The tissue response to the presence of the spirochaete and its toxins is granulomatous, but this is not synonymous with gummatous. The reaction is the same in all essentials whether the gross lesion be primary sore, cutaneous papule, gumma, or fibrosis. Initially an infiltrate of lymphocytes and plasma cells, /

cells, the multifarious lesions of syphilis are only different stages and degrees of this one basic change. The cellular reaction is continuous and progressive; histologically there is no latent stage of the disease - "the worm that never turneth, the fire that is never quenched" - and, although the end-result may be a gross readily recognizable lesion, Warthin has proved that such are not the most frequent, nor the only characteristic evidences, of so-called latent or of late syphilis.

Throughout seven hundred and fifty autopsies, Warthin adopted a meticulously careful histological and bacteriological standard, and his results justify the belief that such a standard is the only one capable of carrying positive or negative conviction. He found histological evidence of the disease in three hundred bodies, and in twenty-five per cent of these, absolute confirmation, by demonstration in the tissues, of the causal spirochete. If we weigh in the balance, the former figure, against the zeal and enthusiasm of the investigator, there still remains the latter, and this finds corroboration in the results of Carrera and Peterson (14: 110). Warthin was concerned with the incidence of visceral syphilis in general and not with lung syphilis in particular. Indeed, he admits failure to devote sufficient time to this organ, but his work, none the less, points to the conclusion that the/

the alleged rarity of pulmonary syphilis in the province of pathology, is founded insecurely on macroscopic appearances; their criterion is the gumma and on this ground they fail.

The relative importance of tubercle and syphilis in determining the production of fibroid lesions in the lung, is accepted, and rightly so, as heavily in favour of the first-named.

The difficulty of distinguishing the fibroid reactions of the two irritants is generally believed to be insurmountable, and no attempt has therefore been made to reduce the relationship to a numerical ratio. Carrera however, in a study of sixty cases of tubercle, on comparing the connective tissue formation with that found in syphilitic lungs, concluded that it was never impossible to distinguish the two. Until this work has been sufficiently pursued it is not possible accurately to evaluate the relative importance of syphilis in producing pulmonary fibrosis, but it appears that Carrera's work can only point in the same direction as Warthin's.

Nor can the testimony of the bacteriologist yet be accepted as sufficiently complete to disprove syphilis in the causation of tissue lesions.

A matter of routine demonstration in the lungs of congenitally syphilitic infants in whom the systemic infection/

infection is most virulent and active, the presence of the causal organism is comparatively rarely established in the lesions of acquired syphilis, in the later and less virulent phase of the disease in adults. Balfour has described granule formation in *Treponema pallidum*, while Levaditi and his co-workers have shown that, although demonstrable spirochaetes are not to be found in the tissues of infected laboratory animals, extract material from such tissue will produce in the rabbit, scrotal lesions from which the organism, in characteristic morphology, can be recovered (65). In the human subject, Wile failed, on diligent search, to find the spirochaete in the cerebro-spinal fluid of a series of cases of locomotor ataxia and general paresis, although injection of rabbit testes with the material produced typical syphilitic lesions, with positive bacteriological findings, in sixty per cent of the experiments (120). On similar lines was the work of McDonagh (68).

It seems probable that, like the spirochaete of African Tick fever, the spirillum body may not represent the entire morphology of the *Treponema pallidum*. Although the organism can be cultured and subcultured through many generations and only the spiral form be found, it does not follow that the biological characteristics in vitro are maintained unchanged in vivo. The conditions of culture and subculture constitute/

constitute an artificial ideal and alter little, or not at all, throughout the experimental life of the strain; morphological constancy in these circumstances is probably nothing more than continued reaction to similar environmental conditions.

It is not reasonable to expect that infecting spirochetes find, in the human subject, an environment which is, and continues to be, favourable to their multiplication. Clinically, the human organism reacts in quite marked degree to infection with syphilis and, although no immunity develops, it is most probable that changes take place in the tissues, the effect of which can only be in a direction inimical to the spirochete. The available evidence, although not conclusive, at least points to ability on the part of the *Treponema pallidum*, to adapt itself to the altering environmental conditions of the infected human tissues, and to exist in some form which is not so far recognised but which can reproduce the typical spiral form when re-introduced, by biological experiment, to fresh surroundings.

Inability therefore, to demonstrate the causal organism in lung lesions, cannot be accepted as proof of the absence of syphilitic infection, and failure of bacteriological confirmation does not detract from the value of the histological criteria of Carrera and Warthin.

From the purely clinical aspect the conflict of evidence is less violent and clinical reports ascribe to the condition a greater frequency. The proof of systemic syphilis is not now difficult; that a pulmonary condition in one the subject of syphilis, is of specific origin, is a matter for conjecture. Unfortunately, absolute proof, parallel to that available in pulmonary tuberculosis, is not forthcoming. The *treponema pallidum* has been described in the sputum of at least one case (9) but the fallacies are obvious and it is doubtful whether the instance is admissible; there are not only the somewhat similar organisms of the buccal secretions, but there are undoubtedly bronchial and pulmonary disturbances of varying severity which are associated with, if not directly due to a variety of spirochaetes of the type of, but not identical with *pallidum* (106:50:15:69.)

The clinical manifestations of the disease are in no way characteristic, and in some cases there may be few symptoms or signs present at all. The series reported by the Karshners (59), Milne (73), and Bryce and Paterson (7), demonstrate very clearly the difficulties of clinical diagnoses. In the latter group, ten out of fifteen cases had presented neither symptom nor sign in life. Of the former series of fifty-five cases which came to autopsy, only four had been diagnosed ante-mortem. In view of this latency, and/

and in the absence of any characteristic symptomatology or constancy of signs, it is not surprising that other authors admit the same failure to anticipate pulmonary syphilis (38: 51: 6: 21.).

In a study of the errors of diagnosis of twelve hundred cases referred as pulmonary tuberculosis, M'Crae and Funk found that of seventy-two which were ultimately shown to be non-tuberculous, four were syphilitic (67). Funk, in reporting further cases, makes the general charge of "want of care in looking for this malady"; he believes that the full import of a persistently negative sputum is not appreciated and that too much credence is given to a negative history of syphilis (36). With both conclusions, and more particularly with the first, the writer finds himself in emphatic agreement. Wood, from a series of extensive lung lesions with repeatedly negative sputa, reports eight cases and arrives at similar conclusions (124).

Radiologically, Parkes Weber has noted the very frequent occurrence of pulmonary fibrosis in patients showing tertiary lesions elsewhere (115), and Watkins, in six thousand five hundred X-Ray examinations, found in one hundred and seventy-two, appearances which on "reasonable interpretation" were indicative of syphilitic processes in the lung (114). It is doubtful whether, in this disease, an aetiological interpretation/

interpretation of a single plate is often justifiable, but as yet no collective effort has been made to gauge, by radiologically recording response to anti-specific treatment, the diagnostic value of the various appearances noted. Until this is done the useful application of such investigations remains impossible.

Much pulmonary syphilitic disease may heal wholly or in part, either spontaneously, or on bare suspicion and treatment, or in an indeterminate number of cases where iodide of potassium is prescribed solely as an expectorant. Bickle (4) and Funk (36) draw particular attention to this latter possibility while the writer, in two cases, stumbled on the diagnosis following spectacular response to this therapeutic standby. With recovery on appropriate treatment so frequent, and the final confirmation of syphilis lacking by reason of the patient's survival, it is to be expected that post-mortem and museum evidence of frequency can only in slight measure, coincide with clinical evidence.

It is all too apparent, from what has already been set down, that no inflexible computation of the frequency of pulmonary syphilis can be ventured; the available evidence, if meticulously weighed, is self-cancelling and leads no where, but none the less, a general review is both permissible and advantageous; the/

the position, thus surveyed, may be summarized in the following conclusions - - - -

- - - - Estimates of the incidence of pulmonary syphilis, based upon pathological evidence are, for the following reasons, both unreliable and low; accurate microscopic criteria for the determination or exclusion of syphilis have not been sufficiently adopted, while contrariwise, too much reliance has been placed upon macroscopic appearances of comparative rarity; post-mortem serological examination has been insufficiently used; in the aetiology of fibrotic lesions the exact relative importance of syphilis and tuberculosis remains undetermined; bacteriological knowledge is not yet sufficiently complete to corroborate or deny, beyond all doubt, a syphilitic causation in pulmonary lesions.

---- Many estimates based upon clinical evidence alone are too high because of gross dilution of the figures. from inclusion of a heterogeneous group of conditions whose sole claim to title has been, only too often, mere association with constitutional syphilis.

---- On the other hand, clinical evidence may well under-estimate the incidence of pulmonary syphilis as the disease is not infrequently symptomless, is liable to spontaneous retrogression, and responds to treatment with such frequency and in such degree that, by reason/

reason of complete recovery, clinical observation is robbed of pathological confirmation; how far the latter point is exaggerated by the empirical use of iodide, is a matter for conjecture.

---- More recent estimates, both pathological and clinical, argue a higher incidence than is generally believed.

---- There is thus a stronger case for the higher incidence than for the lower, but the evidence being as yet insufficiently corroborated, the only acceptable opinion is one which holds, with Ovid, "in medio tutissimus ibis".

SOME AETIOLOGICAL CONSIDERATIONS.

Race:

No racial factor is apparent on review of the cases in the present group, and, so far as the writer has been able to ascertain, no author has demonstrated any ethnological variation, in numbers or in type, of pulmonary syphilitic disease.

Sex Distribution:

Lung affection in syphilis is undoubtedly more common in the male. All writers are in agreement at least/

least in this, and in the series, the apportionment to sexes is, males - twenty-seven, females - nineteen, a ratio of 1.42: 1. The majority of published reports show an even greater preponderance of males - the Karshners (59) give a ratio of 2: 1, Orsagh (80) 2-3: 1, Egdahl (26) 1.5: 1, Bryce and Paterson (7) 3: 1, Landis and Lewis (64) 1.5: 1, Gibbes (38) 4: 1, and Weber (116) 2.5: 1.

Age Incidence.

Many contributors give a very wide age period during which pulmonary syphilitic disease may become manifest. Karshner and Karshner found the disease present at the venerable age of ninety-eight (59). In Tylecote's series of sixteen cases the average at onset in males, was 50.82, and in females, 47.00 (110); Egdahl, analysing thirty-five cases, found the age period to extend to sixty-seven years (26). Bryce and Paterson state it to be thirty-two to seventy-nine years; their average age of onset was forty-four years (7). One only of Weber's seven cases, was under forty years, and four were between the ages of forty-five and sixty (116). The general impression conveyed, is that the disease is most prevalent at, or subsequent to, middle life. In the present series of cases the age of onset of symptoms is set out below -----

AGE GROUP		20-	25-	30-	35-	40-	45-	50-	55-	60-
NO. OF CASES.	MALES	1	4	7	7	2	2	0	3	0
	FEMALES	3	3	6	4	2	1	0	0	0

N.B. The age of one male is undetermined.

It is seen therefore, that of the males, twelve or 44.44%, and of the females, twelve or 63.15%, were affected by the disease before the age of thirty-five years, while of the total cases, only ten (21.74%) were affected subsequent to age forty.

The figures, in contrast to those quoted above, suggest that the disease develops in approximately half of the cases before the age of thirty-five, and in the great majority before forty years; in this respect, they bear out the result of the Karshners' analysis - they concluded that the condition was commonest in the third decade (59) - and are in correspondence with Stanley, all of whose small group of cases were below age thirty-eight (100).

The extremes of age in the present series are for males, twenty-two and fifty-seven years, and for the females, twenty-two and forty-six years. Proportionately therefore, the disease appears to affect females at an earlier age period than males, and is rare in them after the age of forty-five. In males the/

the condition may develop not uncommonly after that age but is rare after age sixty; in both sexes the heaviest incidence falls in the third decade.

Latent period:

Following infection, the duration of the interval which may elapse before the presence of lung involvement makes itself evident, is given in the literature, with irritating and unsatisfying frequency, as two to twenty years. Usually coupled with the statement, is the further information that the pulmonary affection is most often a manifestation of the late tertiary stage of the disease (91:7:26:76:94). The difficulties of dating infection with syphilis are notorious, particularly in females, and the series presently dealt with conforms, in this particular, with general experience. A chronological history of infection was obtained only in the cases of fifteen males and four females. The average period of latency in these groups was 10.15 and 5.00 years respectively. Pulmonary symptoms appeared after primary infection within ----

Years	- 5	5-10	10-15	15-20	20 -
Males	7	2	4	1	1
Females	2	2	0	0	0

Of/

Of the seven males and two females affected within five years of primary infection, four males and one female were affected before the lapse of two years; the shortest period was seventeen months and the next, nineteen months. The remaining three males and one female were affected in the fifth year of infection. Of the four cases affected between five and ten years, three were affected in the sixth year and one in the seventh year. Of the residual six males, five were affected between twelve and sixteen years after infection. To sum up - of nineteen cases in whom the syphilitic infection could be dated, two occurred within twenty months of primary infection, three more were affected before the lapse of two years, eight between the fifth and seventh years, five between twelve and sixteen years, and one at twenty-four years.

It is therefore apparent that lung involvement is not characteristically one of the longest delayed manifestations of specific disease. Comparatively mild and essentially transient lung symptoms occur in the secondary stage of syphilis, and are comparable to the similar disturbances of eruptive conditions and the common exanthems. The present cases were tertiary, and it has been shown that at least half were not late while only a few were very late. Many cases reported in the literature, but not selected for the purpose of this/

this paper, confirm the general statement, there being many reported as having developed within six to eight years, few after twenty years, and exceptionally after twenty-five years. It should be noted before passing on that lung affection appears to develop, not merely at a younger age period in females, but after a very definitely shorter period of latency. The figures bear out the impression of Orsagh (80) that the disease is more virulent in the female, and may have some further bearing on the observation of the Karshners that the mortality is greater in women (59).

Exciting causes; antecedent and concomitant lesions:

Bryce and Paterson (7) are the only authors who have been able to show any factor which may have a determining influence in the localization of the disease in the lung; in one third of their cases the occupation merited the description - "dusty". No other series shows any possible occupational factor, and the present group of cases represents a variety of occupations with no ascendancy apparent in any particular vocation. So far as the writer has been able to ascertain, there is no greater incidence of syphilitic lung disease among those engaged in dusty trades.

More immediately antecedent factors are also lacking, and the selected case histories of the series under review make no mention of any circumstance to which/

which the subsequent development of lung symptoms was ascribed by the patient. In his own cases, the writer has had the same negative experience. The many other cases reported show a similar paucity of predisposing and exciting factors; two cases have been ascribed possibly to injury of the chest wall (26: 48), one may have been precipitated by a sharp bout of malaria (96), while a probable example of the condition (in a congenital) as a pulmonary Jarisch-Herxheimer reaction is reported by Snodgrass (99).

If the fact be, as is now suggested, that the onset of lung changes is not determined by any extraneous factor, then they must be regarded merely as an accidental localization of the widespread ravages of the disease in its tertiary stages. Certainly they are frequently accompanied by a history of antecedent lesions elsewhere, of undoubted syphilitic aetiology, while the demonstration of concomitant specific lesions is even more common. Of the forty-six cases comprising the present series, a history or residual sign of other lesions, manifestly syphilitic in character, was obtained in six; none of these antedated the onset of lung symptoms by more than 2.50 years, and the average period previous to lung onset was 1.70 years - a further indication that the pulmonary changes are not characteristically of the advanced tertiary period. In twenty-four further patients there were present, at the/

the time of examination, other syphilitic lesions which had in all cases made their appearance simultaneously with, or subsequent to the onset of pulmonary symptoms. These frequent and diverse specific manifestations are considered in more detail elsewhere, but it may be noted here that of the entire series no less than thirty cases displayed the pulmonary changes as a part only, of the clinical evidences of widespread syphilitic activity.

The antecedent and concomitant lesions which were present in the cases cover a large part of the field of tertiary syphilis and comprised lesions of aorta, central nervous system, skin and subcutaneous tissues, submucous tissue, cartilage, periosteum, bone, and joint. The experience and recorded statements, of Orsagh (80), Egdahl (26), Howard (56), Landis and Lewis (64), Phipps (84), Wile and Marshall (121), Gibbes (38), Wood (124), Easton (25), Remsen (89), and others, are in consonance with the fact emerging, that in the great majority of cases the lung is not alone in its misfortune.

From what has been set out in the foregoing sections it may be concluded of pulmonary syphilis that -----
----- in the determination of the disease there is no racial factor but circumstances of occupation, injury, and/

and debilitating illness may influence onset in exceptional cases; a pulmonary Jarisch-Herxheimer reaction is a rare possibility.

---- the localization of the disease in the lung is accidental and is accompanied, in two thirds of the cases, by other manifestations of tertiary syphilitic disease.

---- the disease is more frequent in the male.

---- half the cases occur before the age of thirty-five years, and the great majority before forty years.

---- approximately 42% of cases occur between five and seven years after primary infection, approximately 26% within two years, and a similar proportion between the twelfth and sixteenth years; only a small percentage are later, but the disease may occur up to the twenty-fifth year of infection.

---- the condition ensues after a shorter latent interval, and at a earlier age period, in the female.

THE CLINICAL FEATURES OF PULMONARY SYPHILIS.

Apparent Extent and Localization of Lesions:

A considerable number of the published articles convey the general impression that, whereas pulmonary syphilis may be bi-laterally disposed, it is more frequently and most characteristically, unilateral and basal/

basal in its distribution (52:10:110:70:79). Whilst this appears to be broadly true, there does not seem to be sufficient evidence to support the implied conclusion, that a unilateral and basal localization is so much a feature as to be of diagnostic significance. In the series now under review, the disease was clinically bilateral in twenty cases and unilateral in twenty-six - a comparatively small difference in favour of unilateral involvement. In the Karshners' analysis, 36% of the cases showed involvement of both lungs (59), while in a group of eight cases reported by Wood, all showed bilateral distribution of the disease (124). It appears to the writer unwise to draw a conclusion from any but a considerable number of cases, and probable, from the evidence of the present series, that 40-50% of all cases show the apparent presence of lesions on both sides. Of those which showed involvement of one lung only, ten were of the left side and sixteen of the right; this distribution is in agreement with numerous observations that there is a slight predilection for the right side (70:26:7:56:14:29).

The disease may be very localized or widely diffused. Of the series -----

18	cases	showed	clinical	involvement	of	1	lobe	only
11	"	"	"	"	"	2	lobes	
6	"	"	"	"	"	3	"	
3	"	"	"	"	"	4	"	
8	"	"	"	"	"	5	"	

On relating these figures to sex of patient, it is found that of eighteen cases involving one lobe, twelve were males and six, females; of eleven cases involving two lobes, nine were males and two, females; of six cases involving three lobes, four were males and two, females; the ratio of males to females in these groups is respectively 2:1, 4.5:1, and 2:1. In sharp contrast, the groups of three cases (1 M: 2 F.) involving four lobes, and of eight cases (1 M: 7 F) with signs widely diffused, yield respectively ratios of 0.5:1, and 0.14:1, a reversal which lends further support to an impression already obtained that the disease is more virulent in the female.

The individual lobes were involved as follows ----

Right upper lobe	was involved in	23 cases	-	50%
" middle	" "	" "	17	" - 36%
" lower	" "	" "	24	" - 52%
Left upper	" "	" "	19	" 41%
" lower	" "	" "	27	" 60%

These percentages follow fairly closely the figures from the pathological material of the Karshmers and show that, although there is a tendency towards greater frequency in the lower lobes, the general impression of immunity of the upper lobes is not borne out, and the alleged predilection for the right middle lobe/

lobe is not supported. The same points are even more clearly shown by figures relating to individual cases

Involvement of upper lobes only	6 cases
" " lower " "		14 "
" " Upper & R. middle lobes "	-	10 "
" " R. middle lobe only	-	2 "

From a study of the present series therefore, it is apparent that there is a slight predilection for the right side and for the lower lobes, but that the disease is frequently present in upper and middle lobes, not uncommonly confined to the upper lobes, and very rarely localized to the right middle lobe.

METHOD OF ONSET:

The mode of onset of symptoms in syphilis of the lung is stated by Blakeman (5) and by Lisser (66) to be insidious, and according to the latter, the disease has been compared by Fournier, in its stealthy beginnings, with the lack of symptoms arising from a gumma of the hard palate - frequently none until perforation occurs. On the other hand, Douglas (23) states that the condition may be acute, and Orsagh(80) that it is frequently acute. A similar opinion is offered by Bryce and Paterson (7) from their experience of fifteen cases, four of which commenced acutely, whilst/

It is apparent that these cases presented the very constant group of initial symptoms - cough, blood-stained sputum, dyspnoea, chest pain, chills, sweats, and fever, with the development of signs of consolidation in the lung. The general picture conveyed is undoubtedly one of acute pneumonic onset of symptoms, but it is noteworthy that in only three of the cases was the diagnosis of lobar pneumonia ventured; for reasons not stated in the reports, it would appear that the majority of the cases differed sufficiently from this latter emergency to command attention but it is difficult, from the selected material, to form an opinion as to the differential features. One of the cases is from the writer's own experience, and, in addition to repeated rigors and drenching sweats, showed a comparative absence of the mental anxiety and physical distress so characteristic of lobar pneumonia. As the table indicates, chills and rigors were frequent also in the selected cases, but neither the fact of their continued repetition nor the absence of marked general distress is determinable from the reports. Further, the sputum in the writer's case consisted of clear stringy mucus stained uniformly pink with blood, and, in connection with this single positive observation, it is worth recording that in none of the nine selected case records is the description/

description "rusty" applied to the blood staining of the sputum.

It would appear therefore, that the acute onset of pulmonary syphilis differs materially from that of lobar pneumonia in the absence of marked general distress and the characteristically rusty sputum, and in the presence of repeated rigors and sweats.

Among the cases of insidious onset, the initial symptoms of twenty-four were definitely localizing and pulmonary only; they comprised cough, sputum, blood-staining and small haemoptyses. In eight further cases there were in addition, one or more of the following - loss of appetite, tiredness, weakness, loss of weight, nervousness, insomnia, occasional slight fever and sweats. In only two cases pulmonary symptoms were not at first complained of; these cases presented loss of weight, pallor and tiredness with, in one, obstinate dyspepsia. In general, the history of early symptoms in those cases was devoid of any particular characteristic and not dissimilar from that of many cases of pulmonary tuberculosis, but the early predominance of localizing symptoms in the great majority, and the rarity of a preliminary non-pulmonary history, provide salient features.

In/

In summation of the two sections immediately foregoing, it may be concluded that ----

---- a tendency of pulmonary syphilis to unilateral distribution has no diagnostic virtue as it is evidenced in only 57% of cases.

---- there is a slight predilection for the right side

---- the disease tends to affect the lower lobes more frequently, but affection of upper and middle lobes is only a little less frequent; involvement confined to lower lobes is, however, twice as frequent as upper lobe localization; affection of the right middle lobe only, is rare.

---- very widespread distribution is more frequent in females.

---- acute onset, atypically pneumonic in type, occurs in approximately 26% of cases.

---- otherwise early symptoms are pulmonary only, in 52%, and both pulmonary and general, in 17%.

---- a preliminary non-pulmonary history occurs in but 4% of cases.

PRINCIPAL SYMPTOMS AND SIGNS.

DYSPNOEA: HAEMOPTYSIS: COUGH: SPUTUM: PAIN:

Of the numerous and varied symptoms presented by the individual cases of a moderately large group it is apparent that, although none may be termed pathognomonic, there are two which are sufficiently prominent to merit, in some measure, that exalted description. These are dyspnoea and haemoptysis, and they are therefore considered in some detail.

DYSPNOEA:

Thirty-one years ago, Stengel (101) noted the occurrence of dyspnoea in pulmonary syphilis and regarded it, from the stand-point of diagnosis, as a highly suspicious symptom. Since this, the original observation, it has been stressed in numerous papers - Greer (46), Tylecote (110), Blakeman (5), Kirkwood (62), Orsagh (80), Egdahl (26), Bryce and Paterson (7), Lisser (66), Witherspoon (123), and Burrell (11). The present series of cases is numerically considerably greater than any dealt with by these writers and, on analysis, justifies amply their opinions; of the forty-six cases, dyspnoea was ultimately present in thirty-six.

The acuteness of onset and progress of the symptom varied considerably. In those cases which may/

may be said to have presented a pneumonic onset of symptoms in general, dyspnoea was apparent from the first in six. In two cases its appearance was delayed for three days, while in one further case, the dyspnoea did not become evident for two weeks. Of the writer's own cases, one comes within the category acute, and in it the dyspnoea progressed from the outset, attaining a degree of maximum discomfort within forty-eight hours; there was no particular feature in the breathing and it could only be described as hurried and shallow. The respiratory rate was observed, at no time, to exceed 32/minute. In four of the selected cases, the rate was noted in the published report and varied between 28/minute and 36/minute with an average of 32.5/minute. Although the fact is not stated in four of the acute cases, it is more than probable, from the general descriptions given, that the dyspnoea was, as in the remaining five cases, constantly present.

Among the cases of more gradual onset dyspnoea was ultimately present in twenty-seven. In none was it noted as an early symptom, and it appears in the majority to have been delayed for some months or longer - in one case for as long as three years - after the appearance of cough, sputum, and vague ill-health. In three of the writer's cases the average period which elapsed thus, was eight months; in these cases the dyspnoea was slowly progressive up to a point, thereafter remaining stationary. A similar onset/

onset and course was noted in fifteen of the selected cases. The respiratory rate is available in nine of these eighteen cases and varied from 26/minute to 32/minute with an average of 28/minute - a figure slightly below that for the cases of acute onset. In the three cases observed, dyspnoea was constant, but the fact is not stated in thirteen of the selected reports; in six of these however, a respiratory rate is quoted, and it is reasonable to assume that the symptom was constant in them; of the two remaining cases where definite information is available, dyspnoea was constant in one, and present only after slight exertion, in one. It appears therefore, that of the eighteen cases, dyspnoea was a constant symptom in ten, and, from the fact that its presence only on exertion is stated in but one case, may well have been constant in an even greater majority.

Dyspnoea was further present in eight of eleven cases which, although of insidious onset and progress, displayed after a variable period of chronicity, the common feature of an acute exacerbation of symptoms; in five of these cases, including one personally observed, the dyspnoea appeared for the first time with the acute exacerbation of symptoms; in two cases, dyspnoea had been previously present from time to time, and became constant with the rapid onset of more severe symptoms; in the remaining case further information is not/

not available.

In the cases so far considered, dyspnoea was either of acute onset, of gradual onset and progress, or part of a later acute exacerbation of symptoms in general, but in one further case a definite relapsing tendency was manifested - periods of one to two months of freedom intermitting with rather shorter periods of discomfort. Bryce and Paterson (7) noted a similar periodic variation of the dyspnoea in some of their cases, and it should be noted that two of the cases already considered had a period of dyspnoea "from time to time". Quite apart from such variation, no paroxysmal character was noted in any of the cases.

Asthmatic qualities have been ascribed to the dyspnoea by Tylecote (110), Hawes (53), and Egdahl (26), and cases reported by Cockerham (17) and Weber (116).

While it is possible that the pulmonary syphilitic process may provide a peripheral stimulus sufficient to produce, reflexly, a spasm of the bronchial musculature, it is unfortunate that in the cases so far reported the effect of adrenalin is not stated, and equally unfortunate that a specific aetiology of the paroxysms appears to have been deduced solely from the curative effect of anti-specific treatment which included the exhibition of iodide of potassium. An aetiological interpretation of the response to iodides is, in such circumstances, unwise, as is also in the writer's /

writer's experience, the assumption of bronchospasm in cases of dyspnoea which are not classically asthmatic and which have not been put to the test of administration of adrenalin hydrochloride, either in single, or, if failing, in "continuous" doses.

Numerous hypotheses have been formulated to account for this frequent and marked dyspnoea. It is readily conceded that laryngeal, tracheal, or bronchial obstruction from gummatous infiltration and ulceration or from, in the latter instances, external pressure by a gumma, will cause the most severe and progressive dyspnoea. This explanation is advanced by Fowler (32), Howard (56), and Tylecote (110), as the cause in at least some cases. But Conner (18) has shown that obstructive lesions of this nature are unaccompanied by pulmonary syphilis in 92.2% of cases, while in the present series, no single case showed any sign or symptom, as stridor and cyanosis, which pointed to partial occlusion of the large air passages. Indeed, it is shown elsewhere that cyanosis was rare in the cases and, where present, was only slight. Further, three of the five cases in which the larynx was affected by specific disease, had no dyspnoea, and this appears also to have been the case in two instances of laryngeal involvement reported by Munro (76). Pressure from without by a gummatous mass is also/

also ruled out as it is shown that clinical gumma was the least common of the pulmonary manifestations in the group dealt with, and, moreover, while dyspnoea was present in over 75% of the cases, there was no dyspnoea whatever in two of the cases of gumma.

Similarly, a certain degree of accompanying aortitis was present in three of the cases, but in none of them was dilatation sufficiently advanced to cause obstructive pressure on the air-way. Such hypothesis fails to explain the rapid onset and progress of dyspnoea in acute cases, while the rapid and invariable disappearance of the symptom which followed the institution of anti-specific treatment could not be expected in the obstructive dyspnoea of aneurysmal dilatation, nor expected in all cases of gummatous infiltration and ulceration; indeed, it is well recognized, in the latter instance, that the dyspnoea, if influenced at all by treatment, is frequently affected adversely.

Tylecote (110) seeks the cause in the peribronchial fibrosis present in many of the cases. Here again the explanation is insufficient to account for the onset and rapid progress in acute cases, and the equally rapid cessation on anti-specific treatment. Radiological examination in the group showed the presence of fibrosis in fourteen cases, and in seven of them there was no dyspnoea; Tylecote's explanation is thus neither upheld nor refuted, but, in seven of the/

the cases, fibrosis constituted the sole radiological abnormality, and in only one of these was dyspnoea present, while radiological examination after treatment in three of the dyspnoeic cases, showed that the peribronchial shadowing, although somewhat lighter in two, was still sufficient to indicate very considerable residual fibrosis, despite which the dyspnoea had entirely ceased within a very short time of commencing treatment.

Weber (116) has suggested that in some of the cases the respiratory embarrassment may be accounted for by the development of Ayerza's syndrome. The writer has no experience of Ayerza's disease, but, from the publications of Konstam and Turnbull (63), Turnbull (109), Cheney (16), and Parkinson and Clark Kennedy (82), it would appear that the condition cannot properly be included as a variety of pulmonary syphilis, and is a morbid condition of syphilitic origin definitely confined to the pulmonary circulation. It is of course possible that in pulmonary syphilis the circulatory changes characteristic of Ayerza's disease may develop, but in the present series of cases there were none which showed the typical syndrome of dyspnoea, polycythaemia, cyanosis, somnolence, etc., and radiological examination failed to demonstrate, in any case, the enormous right heart hypertrophy and dilatation of the pulmonary stem which are/

are, according to Konstam and Turnbull, to be seen even in the early stages; nor are these characteristics to be found in the post-mortem reports of Parkes Weber (116), Bryce and Paterson (7), Locke Robertson (90), Remsen (89), Fowler (32), Councilman (19), Rolleston (92), Greenfield (44:45), Gowers (42), Green (43), Pye-Smith (88), Ewart (28), Mahomed (72), Hermann Weber (117), Denman (21), or Moxon (74).

The course of Ayerza's disease is steadily progressive, leading to death, in from two to five years, from gallop rhythm and sudden failure or from progressive cardiac decompensation; anti-specific treatment is of little avail. On the other hand, in pulmonary syphilis proper, the progress of the disease follows no such course and the results of treatment are excellent. It is reasonable to conclude that Ayerza's disease is a clinical entity entirely distinct from pulmonary syphilis, and that it does not bear upon the frequency of dyspnoea in the latter disease.

The results of blood examination in the writer's cases do not suggest that there is any effective element of air-hunger in the dyspnoea. It is probable however, from a review of the cases, that pain may be an aggravating, although not an initiating factor in its causation. Although signs indicative of some degree of compensatory emphysema were common in the series, the change, despite the general severity of cough/

cough, was sufficiently pronounced to merit special mention in only four of the selected cases, and would appear to have little influence in the determination of dyspnoea.

Whatever merits may attach to the various factors already considered in the causation of dyspnoea in individual cases, they cannot, failing as they do to explain the observed facts of acute onset, acute exacerbation, and rapid amelioration on treatment, serve to account for the occurrence of dyspnoea in thirty-six of the cases presently under consideration. From a study of these it appears most probable that the dyspnoea of pulmonary syphilis is analagous to that of pneumonia, and of toxic origin. It is found that the cases in which fever, wasting, anorexia and sweats were most marked, manifested also the greatest degree of dyspnoea; generally speaking these were the cases of acute onset. Among the cases of insidious onset, it is found that those which showed recurrent fever and loss of weight over a period, also showed a slowly progressive dyspnoea relating to which the available figures indicate an ultimate degree rather less than that of the acute cases, while of those which suffered an acute flare-up of toxic symptoms, the dyspnoea was correspondingly and rapidly exaggerated in two, and appeared "de novo", in five. Further, the dyspnoea diminished on treatment with a rapidity entirely/



entirely parallel to the cessation of fever - a few days - although physical examination showed that there was no equally immediate change in the lung condition. From the entire series the general impression is gained that, throughout the course of pulmonary syphilis in its development and during its regression on treatment, the dyspnoea conforms, with remarkable parallelism, to the changes which take place in the general symptoms and signs of illness, and that it does not show any immediate or direct relationship to the alterations in the pulmonary symptoms and signs.

HAEMOPTYSIS:

The presence of blood in the sputum was noted by the Karshners (59) in 37% of their cases i.e. in rather more than half of the cases in which cough was productive. In the present series, haemoptysis was present in twenty-three cases - exactly 50%; in four cases there was definitely no apparent bleeding, while in nineteen of the selected reports no mention of its occurrence is made. In the writer's five cases blood was repeatedly present in three, and none visible to the naked eye, in two; on microscopic examination of these latter however, it was found in both that there were present, red blood corpuscles in numbers greatly in excess of the few to be found in many "normal" sputa. It would appear therefore that, although/

although visible haemoptysis is only to be expected in half, or rather more than half, of the cases, bleeding does actually occur in a considerably greater proportion, and in a small group of cases, may be found in all. The general type of the haemoptysis also suggests this; of the twenty-one cases in which blood was visible to the naked eye, it consisted of slight staining or streaking only in seventeen cases, of a moderately large haemoptysis in one case, and of small but definitely separate bleedings in three cases. Of these four latter cases, staining had preceded the more distinct haemoptysis in three, so that in almost all the cases of haemoptysis in pulmonary syphilis, the type of bleeding is slight staining only, with the possibility, in approximately one fifth of these, of larger bleedings. The occurrence of really large haemorrhage is, however, apparently uncommon, and quantities of more than two or three ounces are even rare; in the series, only one case of haemorrhage of two and one half ounces occurred. Lissner (66) found definite haemoptysis - apart from the frequent staining - to be uncommon, while Tylecote (110) states it, with the same qualification, to be rarely brisk or fatal. But it is possible for severe and even fatal haemorrhage to occur in pulmonary syphilis - Hoffmann, Rosenbach and Aufrecht (55) quote cases from Lancereaux and from/

from Carlier which had severe bleeding, while Downing (24), Remsen (89), Goodhart (41), and Fowler (32) quote fatal cases. These are, however, rarities, and, as it is evident that haemoptysis in pulmonary syphilis is typically minimal, it is reasonable to conclude that microscopic examination will show that occult bleeding occurs in many more of the cases.

The blood was well mixed with the scanty sputum in the writer's cases - reddish brown in two, and pink in one. In one case in which haemoptysis was more definite there was no preliminary staining. Among the remaining seventeen cases, the sputum was apparently similarly "stained" in fourteen, "streaked" with red blood in two, and presented a "prune juice" appearance in another. Lisser (66) noted the frequency of staining and Stanley (100) stresses the intimate admixture of the blood and absence of frothy appearance. In the three cases of more definite haemoptysis, the sputum was, however, frothy in one, while in the single case of moderately large haemoptysis there were frothy fluid blood and later, clots; these appearances are no more than would be anticipated, but Winfield's (122) description of "glairy stringy mucus with sometimes small clots of blood" appears to have little application to the present series, at least in so far as the haemoptysis is concerned.

The appearance of blood in the sputum is an early manifestation/

manifestation in pulmonary syphilis - Blakeman (5) and Bryce and Paterson (7) have pointed this out. Of the writer's cases in which staining was noticeable, it was evident shortly after the appearance of sputum in two cases of insidious onset, and was present within thirty-six hours in one case of acute onset; of the eleven remaining cases of acute onset, haemoptysis appears in the clinical description of nine, and, although detailed information is not available, it may be assumed from the reports, and especially in a condition ultimately becoming chronic, to have been very early. Of the nine remaining cases of insidious onset exact positive information is again not available, but in two cases only was the bleeding delayed definitely for a period of six months. Absence of contradiction therefore, of personal experience, even so limited, leads to the conclusion that in cases both acute and insidious in onset, haemoptysis is an early sign of pulmonary syphilis.

Having once appeared, the presence in the sputa of blood is likely to continue or to be repeated at intervals. Of those twenty cases which showed staining or streaking, this was constant in nine, frequent and recurrent in seven, and present on one occasion only, in one. In three cases the information is not available. It is not only the minimal bleeding which is prone to continue or recur - of the three cases which/

which showed slight definite single haemorrhages, these were repeated at frequent intervals in two, and occasionally in one, while in the case of single moderately large haemoptysis a repetition occurred six weeks later; thereafter, anti-specific treatment having been commenced, haemorrhage ceased. In the two cases which showed only microscopic evidence of bleeding, the large numbers of red blood corpuscles were a constant finding. Greer (46) reports a similar sputum. Tylecote (110), Fiacci (quoted by Munro 76), and Blakeman (5), remark upon the frequent recurrences, while Stanley (100) states that haemoptysis is seldom absent for more than a few days. Analysis of the present series is entirely corroborative and suggests, moreover, that in at least 25% of the total cases, blood is constantly present in the sputum, if not visibly staining it, then microscopically in excess of what may be passed as "usual"

Various opinions have been expressed as to the source of bleeding. Tylecote (110) ascribes it to early bronchiectatic ulceration. It does not seem possible however that bronchiectasis would occur so frequently, and progress so rapidly, to account for the early appearance of haemoptysis in a large proportion of cases, and the suggestion is manifestly inadequate to explain its presence in acute cases; it/

it is also very doubtful that ulceration of the bronchial mucosa is characteristic of the early stage of bronchiectasis. More definite rebutting evidence is at hand in the series under consideration - while blood is known to have been present in the sputa of twenty-three cases, it was found radiologically that bronchiectasis was present only in two of them and further, that in both, the degree of bronchial dilatation was slight. Treatment directed towards the specific infection resulted in cessation of most signs and symptoms, including the blood-spitting, whereas further radiological examination showed that the bronchiectasis was still present, and, clinically, the few residual symptoms and signs were consistent with its continuance.

Witherspoon (123) states that the blood originates from the larynx or from specific ulceration of a bronchus. The intimate admixture with the sputum which characterizes the frequent staining does not, however, suggest a laryngeal origin; the latter would be more likely to result in red streaking of the sputum or in the presence of small clots; either appearance was rare in the series. There are in the group, five cases which showed laryngeal involvement; in two of these there was no bleeding, while the remaining cases showed the customary slight staining with intimate admixture. The two cases which showed red streaking appear to have had no symptom of laryngeal affection/

affection, and, as haemorrhage does not occur early in syphilitic disease of the larynx, it would be anticipated, were this a frequent source of bleeding, that definite symptoms referable to the larynx would have been present in a much greater proportion of the cases.

The presence, as a concomitant syphilitic lesion, of aortitis, has been noted in the literature and occurred in three cases of the group. Haemoptysis might conceivably arise from this cause by true aneurysmal leaking, from the presence within the larger air tubes of granulations secondary to advancing erosion, or from the grosser sequelae of occlusion. In only one of the cases was a definite slight aneurysmal dilatation present, and the case showed neither blood-stained sputum nor evidence of pressure upon trachea or bronchi; in the others, aortic dilatation was radiologically very slight, pressure symptoms and signs absent, and haemoptysis present in one only. In the production of the characteristic haemoptysis of pulmonary syphilis therefore, concomitant aortic disease has no influence.

Apart from the foregoing possibilities it is well known that haemoptysis - frequently severe and often fatal - may take origin in syphilitic disease of the larger air tubes, either by direct ulceration, with or without ultimate penetration, or from the secondary/

secondary occlusion effects in the bronchi and lung on the "distal" side of the disease. Numerous examples of the latter sequence are to be found in the literature, many of them masquerading as cases of pulmonary syphilis. Identical secondary lung conditions are, however, found in non-specific bronchial disease, foreign body, lesions causing extra-bronchial pressure etc., and are obviously dependent upon the bronchial obstruction and interference with lung drainage per se, rather than upon any particular factor of aetiology. Furthermore, Conner (18) has shown in a large series of cases, wherein the bronchial lesion was undoubtedly specific, that 92.2% of cases were unaccompanied by syphilitic disease of the lung tissues and that, although some degree of obstruction was present in 85%, secondary effects distal to the bronchial lesions were present only in 20%. In the selection of the present group of cases all such have been rejected with apparently little or no diminution in the frequency of haemoptysis, and, as a source of haemorrhage therefore, directly or indirectly, lesions of the larger bronchi appear to be excluded.

The point of origin of bleeding must, then, lie in the smaller air tubes or in the lung tissue proper, and the characteristic frequent or constant staining intimately mixed with a scanty sputum has suggested to certain writers the occurrence of capillary oozing in this area. Munro (76) regards this as coming from the/

the ulceration of small gummata; Stanley (100), as from slow ulceration of a bronchial surface. No matter how frequent and characteristic of specific disease in the larger air tubes however, it cannot be said that ulceration is common in the altered lobular structure of pulmonary syphilis. Indeed, Councilman (19) lays particular emphasis upon its absence, and, as a feature of the many excellent pathological descriptions of others, it is rare in comparison to the clinical incidence of the staining ascribed to it.

As long ago as 1877, Greenfield (44) thought the liability to haemoptyses in pulmonary syphilis, due partly to the vascularity of the connective tissue growth in its early stages, and partly to constriction of veins by secondary thickening. Although the latter observation is not corroborated, consideration of the published work does leave little doubt that the lesions of pulmonary syphilis are very vascular ----- Hartung and Friedman (52) found many new-formed capillaries scattered throughout the tissues; Carrera (14) states that there are many microscopic gummatous formations which consist essentially of "angio-blastic proliferations infiltrated with plasma cells -----" ; Letulle (quoted by McIntyre 70) states that in the miliary gummata many new capillaries are to be seen; Green (43) emphasizes the great vascularity of the lesions and describes an illustrative case; Rolleston /

Rolleston (92) found the terminal bronchioles difficult to recognize while Remsen (89) describes their appearance in more detail - "The epithelium bulges into "the lumen and sometimes causes a polypoid projection" "composed mainly of young connective tissue and tiny "vessels"; Councilman (19) gives a similar description, while McIntyre (70) describes actual destruction of the lining epithelium with replacement by granulation tissue; Gowers (42) and Rocke Robertson (90) describe the presence of red blood cells in the alveolar exudate and Councilman found "in some places ----- small foci of haemorrhage". In addition to the active capillary vascularization of the tissues, a state of chronic venous congestion was noted by Warthin (113), while Carrera (14) found well marked brown induration in 82% of a series of syphilitic bodies, and, although he was unable to prove definitely that the associated fibrosis was syphilitic, it is suggestive that in a control series of non-syphilitics only 5% showed this evidence of chronic venous congestion. Destructive and degenerative changes of small vessels have also been described; Councilman (19) found that "from " "hyaline degeneration the capillaries were con- " "verted into rigid tubes which remained open on " "section", while Rocke Robertson (90) describes "widespread necrosis of vessels and alveolar walls".

It appears reasonable to conclude that the characteristic slight haemoptysis of pulmonary syphilis is/

is derived directly from the affected areas of the lung, and that it depends for its occurrence, chiefly upon vascularity of the lesions from the formation of new capillaries - sometimes angiectatic - and from a condition of passive congestion, and, to a less extent, upon degenerative changes in existing capillaries and small vessels. The constant stress and trauma enjoined by the general severity of the cough are probably the determining factors of its frequency and continuance.

The occasional sharp, and the rare fatal haemorrhages, cannot be accounted for by the mere capillary vascularity of the pulmonary lesions; they must arise from the giving way of more sizeable vessels. As the same arguments which have been set out against the origination of slight bleeding in the proximal respiratory tract, apply equally well in consideration of the site of more definite but less common haemorrhages, these must arise in the affected areas of the lung itself by erosion and rupture of vessels. The comparative absence, in the lesions of pulmonary syphilis, of ulcerative processes has already been remarked, and, although cavitation appears to be distinctly rare in this disease, the possibility of its occurrence is not unappreciated (McIntyre 70; Karshner and Karshner 59; Orsagh 80) nor its actual presence unknown - Denman(21) reports a case and Fowler (32) describes several specimens/

specimens illustrating both the softening and ultimate ulceration of gummata; these were, in the main, very small and the resultant cavities exemplify well a type of lesion readily capable of giving rise to moderate haemoptysis by erosion of vessels in the cavity wall; McIntyre (70) states that such cavities are lined with friable granulation tissue which shows within it, remains of the original lung structure, especially blood vessels. The literature yields four references to fatal haemoptysis in pulmonary syphilis. Fowler (33) cites a fatal haemorrhage resulting from simultaneous ulceration of a softened bronchial gland into a large arterial stem and a main bronchus. Downing's (24) description (quoted from Osler) appears to be that of a case originally reported by Remsen (89) in which a cavity in the lower lobe, 3.5 cms. in diameter and filled with clot, opened directly into a bronchus; a probe passed down the pulmonary artery entered the cavity. In Goodhart's case (41) there was a cavity at the base $2/3$ inch in diameter and occupied by a ruptured aneurysm 1 cm. in diameter.

Cavitation and frank haemoptysis in pulmonary syphilis have thus the common feature of comparative rarity, and, while fatal haemoptysis is extremely rare, in two cases of pulmonary syphilis proper in which it did eventuate, the haemorrhage was determined by the agency/

agency of an ulcerative process. It is concluded therefore that the very occasional sharp haemoptysis of pulmonary syphilis is derived from ulcerative lesions in the affected areas of the lung.

THE SPUTUM:

In addition to the frequent presence in it of blood, the sputum in pulmonary syphilis displays some further points of interest.

Howard (56) found cough to be productive fairly constantly; in the Karshners' series, sputum was present in 71% of the cases (59). In the group now under consideration, sputum was present in 82.6%; in two cases there was definitely no sputum, while among the remainder of those selected from the literature, the fact is undetermined in six. In all but seven cases the expectoration appeared early and it was not long delayed in three exceptions, so that in approximately 70% of the total cases, the early appearance of sputum is to be expected; in four cases the time of appearance of sputum is not recorded.

The stated quantity of sputum provides a sharp contrast to the general severity of the cough, being noted, among the selected cases, as scanty in nineteen cases, moderate in quantity in four, and copious in seven; in three cases no indication of the amount of sputum is given in the reports. Among all five of the writer's/

writer's own cases the twenty-four hour quantity rarely exceeded one ounce, so that, of the thirty-eight cases having sputum, the quantity was scanty in twenty-four. Hawes (53), Thompson (105), and Gibbon (39), note the same fact.

The naked eye appearance of the expectorated material varies - of the seven cases with copious sputum, this was purulent in three, and muco-purulent in four; of the four sputa moderate in quantity, two were muco-purulent, and two mucoid; the remaining twenty-seven sputa were mucoid, with three exceptions noted as muco-purulent, and four not stated. The apportionment of the thirty-eight sputa is therefore - mucoid twenty-two, muco-purulent nine, purulent three, not stated four. A mucoid sputum thus predominates in the series and is probably a characteristic feature of the condition as Winfield (122), Stanley (100), Douglas (23), Weber (116), and Kirkwood (62) have noted. The frequent close admixture of small quantities of blood with a scanty sputum, most often entirely mucoid in character, is a feature of the disease to which the writer can find no parallel in any other pulmonary condition. Muco-purulent sputum appears to be fairly common but frankly purulent sputum was definitely uncommon in the group, and, although Howard (56) states that nummular expectoration may occur, the description could not be applied to/

to any of the present instances.

Fowler (32) states that the sputum may be offensive; in the series of cases under review, abundant foetid sputum was noted in two cases only, and in both of them bronchial dilatation was demonstrated radiologically. Manifest bronchiectasis was present in three further cases all of which had copious sputum, purulent or mucopurulent, but not foetid. The same can be said of two of the seven cases which showed only peribronchial fibrosis on radiological examination, but in which definite dilatation of bronchi was not noted. From these figures it would appear that there is considerable truth in the statement of Hawes (53), that expectoration is scanty in pulmonary syphilis unless there has developed a complicating bronchiectasis, and further, that, save in similar circumstances, foetor does not occur.

Unfortunately, except in regard to the absence of tubercle bacilli, microscopic examination of the sputa is not well reported in the selected case records, so that it is necessary to depend upon the sputa of five cases - an insufficient number - but supplementing the information derived therefrom by reference to the recorded statements of others. In four cases the sputum consisted of stringy mucus with a notable scarcity of formed elements - occasional healthy polymorpho-nuclear leucocytes, a rather greater number of/

of lymphocytic cells, and the usual few salivary corpuscles and epithelial cells. The fifth sputum which was also mucoid in appearance consisted of the same mucus but with numerous polymorphonuclear leucocytes in various stages of degeneration, and a few lymphocyte cells. Red blood corpuscles were very numerous in three cases and plentiful in two. In none of the cases were eosinophils or much debris notable constituents, while elastic fibrils or other evidences of tissue disintegration were entirely absent. Curschmann's spirals or crystals were not found; Cockerham (17) and Weber (116) who report asthma-like paroxysms, do not report their presence either. Howard (56) quotes von Cube and Schach as having found connective tissue fibrils, and Gratz and von Cube as having demonstrated in the sputum, recognizable portions of gummatous tissue, while Thompson(105) records the presence of caseous debris and necrotic tissue with much mucus; although the spectacle of a patient coughing up portions of gumma is an intriguing one, the evidence derived from a fairly wide review of the literature points to the rarity of disintegrative processes in pulmonary syphilis, and to the conclusion that such findings in the sputum must be very exceptional.

In the cases selected for the purpose of this paper, the absence, from the sputum, of tubercle bacilli, is/

is a "sine qua non". In the writer's cases and in four of those selected, the exclusion further, of pathogenic fungi was also established. Douglas (23) makes a point of the small numbers of micro-organisms to be found in the sputum of pulmonary syphilis. In the writer's cases of purely mucoid sputum and few pus cells, micro-organisms were few in number and all Gram-negative cocci of the catarrhalis group with, in one case, scanty pneumococci in addition; the fifth sputum, microscopically muco-purulent in character, contained in considerable numbers, similar Gram-negative cocci, streptococci, and a few pneumococci; this was the case of acute pneumonic onset. Cultural methods were not applied to these sputa and it is not therefore claimed that the details given embody a full report of the bacteriological characteristics, but it would appear that simple staining methods do undoubtedly show a paucity of micro-organisms, particularly of pathogens. In respect of the small number of pneumococci present in it, the sputum of the case of acute pneumonic onset is worthy of special mention.

In no case among those selected was the *Treponema pallidum* detected in the sputum, and the writer, in three of his own cases, on careful and repeated search, was unable to demonstrate the organism by any method. Saprophytic spirochetes were however demonstrable, and it is almost certain that had the *Treponema pallidum* been/

been present it would have been identified. The presence in the sputum of the causal organism has been reported (9) but in view of the enormous number of negative reports, and the fallacies to which its identification in sputum is open, it is very doubtful if Buchanan's finding can be unreservedly accepted.

COUGH:

In the Karshners' series cough was present in 88% of cases (59); Howard (56) found it to be almost invariable and Blakeman (5) states that it is the most frequent symptom. Study of the present cases evolves nothing to disturb this unaccustomed unanimity; in one case cough may or may not have occurred but it was undoubtedly present in the remainder.

In all twelve cases of acute onset cough was present as an initial symptom. Similarly, among those thirty-four cases of more gradual onset, cough was one of the early symptoms in thirty-two, was preceded by vague general symptoms in one, and in one further case of identical onset, failed to warrant mention. In eight of the cases of insidious onset wherein the information is available, the symptom antedated the appearance of more decisive and severe evidence of illness for a considerable period, being associated, in the early stage of the disease, with vague ill-health; in these cases cough was followed by the development of more severe symptoms after an average interval/

interval of twenty-three months - maximum six years.

Cough was severe from the onset in ten of the acute cases and may or may not have been severe in two others. In seven of the insidious cases cough does not appear at any time to have caused distress but the remaining cases show that it has a general disposition to become, slowly or rapidly, a prominent and bitterly execrated symptom, constantly present in the majority, intermittent in a few, and characteristically worse night and morning; the latter point has been noted by Thompson (105), Kirkwood (62), and Blakeman (5). Intermission was apparent in three cases, the cough, as Howard (56) also noted, remaining in abeyance for weeks at a time; apart from these few, however, cough was persistent, and, in view of the frequent history of ineffectual empirical treatment, apparently uninfluenced by the usual remedies. A further characteristic exemplified by the series is a tendency for the cough to become spasmodic - in thirteen spasms were severe and in four, violent; the liability of the cough to assume this character has been stressed by Bryce and Paterson (7), Lisser (66), and Stanley (100).

The experience of the writer in his own cases supplemented by information available in the published material, suggests that there is, in the cough of pulmonary syphilis, no particular quality of tone which/

which is not accountable to the co-existence of specific disease of larynx or aorta.

PAIN:

The occurrence of chest pain in pulmonary syphilis is stated to be symptomatic by Greer (46) and by Kirkwood (62). Blakeman (5) places it fourth in frequency after cough, haemoptysis, and dyspnoea; Howard (56) and Powell and Hartley (51) regard it as common, while Fowler (32) states that it is not prominent. In the present cases pain definitely did not occur in five, and was a symptom of nineteen; it occurred in three of the writer's own cases, and in two of these was a source of bitter complaint. In twenty-two of the selected cases the presence or absence of pain is not recorded.

Of the twelve cases in which the onset of illness was acute, pain was present as an initial symptom in ten. The remaining nine in which pain was complained of were insidious in onset; in three, the symptom appeared at an early date and in six, was a late complaint; in two of the latter the occurrence of pain was sudden and accompanied an acute exacerbation of symptoms in general. Bryce and Paterson (7), in a smaller group of cases, found pain to be late while Winfield (122), to the contrary, states that pain in the scapular region is usually present before the cough/

cough becomes productive.

In one case pain was directly associated with severe spasms of cough, was accompanied by tenderness along the costal margin, and appears to have been entirely muscular; in what follows this case is disregarded. For the remainder it is natural to attribute the pain, as do Blakeman (5) and Kirkwood (62), to the presence of pleurisy. Contra-lateral pain in pleurisy is extremely rare and in these cases the pain does certainly follow, very closely, the distribution of the syphilitic process in the lung. Six cases had left-sided pain - disease was present only on that side in five and was bilateral but homolaterally more advanced, in one. Six cases had right-sided pain - four showed lesions confined to that side and two, bilateral disease. Six cases had bilateral pain - five showed involvement of both lungs, while one had unilateral signs only. In seventeen of these cases radiology provides the basis for the statement of distribution, and in fifteen the radiological and clinical signs indicated the presence of consolidative processes of the lung tissue in which the pleura might reasonably be expected to have participated.

That the localization of pain is directly related to the situation of the pulmonary lesions is evident, but that it is due to pleurisy is not so clear. Its general/

general character - a constant dull ache worse, in some cases, at night - is not typical of inflamed pleura. Kirkwood (62) states that the pain is aggravated by the respiratory movements but this characteristic was definitely present in only two cases, in both of which clear evidence of pleural involvement was obtained (vide infra). Thompson (105) quotes a case with constant pain and marked tenderness on pressure but this was not evident in the writer's cases and does not appear to have been present in any of those selected, although in two cases, wherein the syphilitic process extended to the thoracic wall and in which neither pain nor tenderness on pressure were present, the pleura must of necessity have been involved. In none of the writer's own cases were friction sounds at any time detected, and, in the fifteen selected cases with pain, the pathognomonic sign is recorded only in two; in one case pleural effusion developed. Among the painless and indeterminate cases, these two evidences of pleural involvement were equally rare - they occurred respectively in one, and in two instances. So far as the writer has been able to ascertain, Gibbon (39) and Blakeman (5) are the only authors who have remarked the rarity of friction as a physical sign in pulmonary syphilis. It is to be noted that other comparably decisive signs were not rare. The absence of friction is readily explained by assuming that pleural involvement/

involvement is most frequently located on the diaphragmatic, vertebral, or mediastinal aspects of the lung. Pathological reports do not submit any evidence which will justify such an assumption, and, in respect particularly of the former possibility, the clinical evidence gives no indication of any special incidence of diaphragmatic pleurisy; referred phrenic pain occurred in only one case and in the writer's cases hyperaesthesia in the area of sensory distribution of the third and fourth cervical nerves and De Mussey's buttons of tenderness were not apparent. Landis and Lewis (64) go so far as to say that these accepted evidences of diaphragmatic pleurisy have never been elicited in pulmonary syphilis.

Apart from acute inflammation, chronic pleural thickening was apparent in only two of the cases radiologically examined; as a cause of pain in acute cases it would appear to be out of the question.

Shavlem (98), Cockerham (17), Howard (56), and Landis and Lewis (64) all suggest that pain may be due to concomitant perihepatitis. This might well account for pain low down on the right side and might even explain referred phrenic pain, but pain limited to the right side occurred only in six cases, and, of these, confirmatory evidence of liver disease is not forthcoming. Howard (56) and Stanley (100) report cases of liver enlargement accompanying pulmonary syphilis/

syphilis but in these, pain does not appear to have differed from cases in which there was no evidence of liver involvement. Two cases in the series presented definite enlargement of the liver; pain was not present in one and was bi-lateral in the other.

Howard (56) states that the pain of pulmonary syphilis may be substernal. Although this was not so in the series it is perhaps worth while to relate the occurrence of pain to the presence of aortitis; this concomitant was present in three cases - one had no pain, one is not established, and one had pain low down in the chest.

Of the principal features of pulmonary syphilis viz. dyspnoea, haemoptysis, pain, cough and expectoration, it may be concluded, in summary of what has been set out in the foregoing sections, that ----

---- whilst none are strictly pathognomonic certain characteristics of the dyspnoea, haemoptysis, and sputum, are sufficiently frequent to be credited with some diagnostic significance.

---- dyspnoea is present ultimately in 78% of cases; it may be of acute onset, of gradual onset and progress, or part of a later acute exacerbation of symptoms; a relapsing course is not common; constant dyspnoea is the rule; its ultimate degree is greater in acute/

acute than in insidious cases, appears to be limited, and does not exceed 36/min; an asthmatic character is not proved; the dyspnoea is not due to laryngeal, tracheal, or bronchial obstruction, anaemia, emphysema, peribronchial fibrosis, or to associated vascular changes of Ayerza's disease; it is directly related to, and has a common origin with, symptoms and signs of toxic origin; pain may be an aggravating factor.

---- haemoptysis occurs in 50% of cases; it is typically minimal but there is a liability, in 20% of those cases, to larger haemorrhage; fatal haemoptysis is extremely rare; it is probable that occult bleeding occurs in a considerable majority of cases; the blood is intimately mixed with the sputum; red streaking and "prune juice" appearances are uncommon; haemoptysis is probably an early manifestation in most instances, and, having once appeared, tends to be constant or frequently recurring; the characteristic staining is not due to bronchiectasis, laryngeal or aortic disease, nor directly or indirectly to specific disease of the large bronchi, but is derived from the pulmonary lesions and is there accountable to the formation of new capillaries, sometimes angiectatic, to chronic venous congestion, and, to a less extent, to degenerative changes in existing capillaries; the general severity of cough is probably responsible for its frequency and continuance; the occasional large, and the/

the rare fatal haemorrhages are derived from ulcerative lesions in the lung.

---- cough is the most frequent symptom; in both acute and insidious cases it is an early feature, and, in the latter type, may antedate the appearance of more decisive symptoms by many months or even years; it is severe from the outset in acute cases; in insidious cases it becomes severe; it may be intermittent but is generally a constant symptom, tending to be spasmodic, and characteristically worse night and morning; there is no particular quality of tone.

---- sputum is present in 80% of cases, is generally scanty and mucoid, and of early appearance; more abundant sputum is not infrequent, indicates a complicating bronchiectasis, and is usually muco-purulent; frankly purulent sputum is uncommon and foetor more so.

Microscopically, the characteristic sputum consists of stringy mucus with small numbers of polymorphs and lymphocytes; red blood cells are numerous; other formed elements, and evidences of tissue disintegration, are rare; micro-organisms are few and non-pathogenic; the presence of *treponema pallidum* has not been satisfactorily established.

---- pain in the chest is common and is a very constant initial symptom of acute cases; it is less common in insidious cases, in which it is more frequently late; in a few cases it is aggravated by respiratory movement/

movement and due to pleurisy, but, although directly related to the pulmonary lesions and therefore not fortuitous in its occurrence, it is, in the majority of cases, of a constant aching character, unaffected by respiration, and not due to pleural inflammation, acute or chronic, nor to perihepatitis or aortitis; tenderness to pressure on the chest wall is very rare.

TEMPERATURE:

SWEATING:

RIGORS:

LOSS OF WEIGHT:

MUSCULAR WEAKNESS.

TEMPERATURE:

In order of frequency, Blakeman (5) places fever fifth after cough, haemoptysis, dyspnoea, and pain. Greer (46) states that fever and sweating are rare, Howard (56) that they are rare and when present mild. On the other hand, Shavlem (98) states that there is usually a history of prolonged fever while Lisser (66) regards sweating as common and fever as the rule. In relation to this evident disparity of opinion, a consideration of the present series of cases amply substantiates the latter view.

In twelve cases in which the onset of illness was acute, fever was present from the first in eleven; one case may or may not have been afebrile. The limits of raised temperature in these cases lay between 99.2°F. and/

and 103^oF. In two cases the course of the fever from commencement was remittent, in one case remittent with occasional intermission, and in five cases temperature was maintained at a general level of 100^oF. to 101.5^oF. for five to eight days, thereafter becoming remittent in one case, and irregularly intermittent in four; in two of these latter cases the intermission subsequently developed a periodic character, febrile periods of approximately five days alternating with intervals of a week or more during which the cases were afebrile. In three cases details of the progress of fever are not available.

In thirty-four cases the onset of symptoms was insidious and in three of these the course of the disease remained afebrile throughout. In six cases the presence or absence of fever is not recorded. Of the remaining twenty-five cases, two were subject to slight occasional elevations of temperature from the outset while in the remainder the occurrence of obvious fever was considerably delayed; these cases therefore support the opinion of Fowler (33) that the disease is afebrile in its early stages. The subsequent development of raised temperature was sudden in nine cases and accompanied by a general exacerbation of the illness; in seven cases progress was gradual, and in seven further cases information is lacking.

The/

The type of temperature chart ultimately displayed shows a remarkable constancy. In fourteen cases temperature became regularly intermittent with rises to 100°F. - 101°F.; in two of the writer's cases and in six of those selected peak temperature was attained in the late afternoon. In three cases intermission was irregular, and in three further cases a periodic character became established, bouts of fever of a week or more alternating with rather longer afebrile periods in two cases, while in the third the febrile periods lasted for four to six weeks, the afebrile for as long as four months; this latter case continued in this matter for three years before coming to diagnosis. In five cases requisite details are not available.

Among a total of forty-six cases therefore, thirty-six displayed varying degrees of temperature while only three cases were definitely afebrile. Fever was an almost invariable characteristic of the acute cases but was decidedly rare in the early stage of the cases of gradual onset; its appearance in a probable small majority of these cases was gradual, but in a definite and considerable proportion it was undoubtedly sudden and associated with a general exacerbation of symptoms. In twenty-eight cases the temperature adopted ultimately a definite type - remittent/

remittent in four, intermittent in nineteen, and intermittent with periodic tendency in five.

RIGORS:

The occurrence of rigors in association with the elevation of temperature was almost entirely confined to the cases of acute onset; of those twelve, nine had rigors, whereas of thirty-four cases of insidious onset, severe shivering attacks occurred only in three - during each bout of periodic fever in one, and accompanying in two, a general acute exacerbation of the illness. In one acute case and in four insidious cases rigors did not occur; the fact is indeterminate in twenty-nine.

SWEATING:

Among the entire series of cases, sweating was present as a notable symptom of twenty-one, definitely did not occur in seven, and remains undetermined in eighteen; of the writer's own cases, only one of acute onset had sweats - they were repeated, soaked the bed linen, and occurred day and night. In five further cases the sweats are stated to have been drenching, and in fourteen, to have occurred at night. Of the twelve cases of acute onset, sweating was present in eight; in two of those with early remittent fever, sweating was present from the outset while of the five/

five cases in which temperature was at first sustained, three definitely did not develop sweats until later. Concerning the remainder of the acute cases pertinent detail is wanting. Thirteen cases of insidious onset ultimately developed sweating; in five, sweats were occasional during the developing period of slight fever, becoming more frequent as remission or intermission of temperature progressed; in seven cases, sweating was absent in the early stages but appeared with the sudden later onset of pyrexia. In one further case which showed periodic bouts of fever sweating was present only during the attacks. In seven of the insidious cases sweats did not occur; two of these were afebrile. The presence or absence of the symptom is undetermined in fourteen of these cases.

At the time of diagnosis two cases had had sweats for less than six months, three for approximately twelve months, and two further cases for fifteen and twenty-one months respectively; in four, sweating had been present for an unspecified but seemingly considerable time; in the remainder the duration of the symptom cannot be estimated.

As in regard to fever therefore, the present group of cases confirms the statement of Lissner (66) that sweats are common; they are frequently severe, occur especially at night, and are definitely associated, /

associated, as might be expected, with the development of remission or intermission of the temperature. They occur particularly in the cases of acute onset and in those of later acute exacerbation. Their duration appears to be limited only by diagnosis and institution of anti-specific treatment.

LOSS OF WEIGHT: MUSCULAR WEAKNESS:

Burke (10), Greer (46), Howard (56), and Kirkwood (62), in their several publications, create the impression, in statements of greater or lesser emphasis, that loss of weight in pulmonary syphilis is neither progressive nor marked. A limited experience of five cases has led the writer to a contrary opinion, one only having shown no loss of weight.

Including these cases, it is found on analysis of the series that four cases did not lose weight; sixteen lost weight in known and specified degree; in three, there was "little" loss of weight and in eleven, "marked" loss. In twelve cases the fact of weight loss is undetermined.

Among the cases of which precise information is available the average loss of weight was 30.6 lbs; the average for ten males was 28.2 lbs, and for six females, 34.6 lbs. The maximum for any single case was 70 lbs; one other lost in weight 65 lbs, while in the remainder individual loss did not exceed 42 lbs/

lbs. The loss of flesh was usually progressive up to a point, the body weight thereafter tending to remain stationary. In cases of acute onset there was fairly rapid loss of weight, but again not unrestricted, a point being attained when the general condition ceased to deteriorate - one such case, diagnosed after a course of more than a year, lost 42 lbs. in the first six weeks of illness, the body weight thereafter remaining stationary; Cockerham (17) draws attention to this feature. The average time-loss of six acute cases was 30.8 lbs in 5.8 months, and in five cases of insidious progress, 31.0 lbs. over a period of 13.8 months. Five further cases suffered slow progressive loss of weight with, later, accompanying a sudden general exacerbation of symptoms, more rapid loss; for the unspecified period the final mean loss was 43.75 lbs.

It has been noted above that the total loss of weight in only two instances exceeded 42 lbs. Similarly, of the eleven cases which lost much weight but concerning which more accurate information is lacking, two only are stated to have been emaciated. In six cases the loss of weight was slowly progressive with, in two cases, acute exacerbation and rapid further progress. In one case the onset of illness was acute and the loss of weight rapid, while yet another which/

which showed periodic fever with long afebrile intervals tended to recoup the weight loss after each pyrexial attack; a similar periodic variation was noted by Bryce and Paterson (7).

Kirkwood (62) who denies the liability to much loss of weight found that loss of strength and persistent fatigue were marked features in pulmonary syphilis, while Lissner (66) regards rapid fatigue as characteristic. Four of the cases personally observed complained of general weakness and a constant feeling of weariness unrelieved by sleep. In the entire series such complaints are unrecorded in twenty-three cases but were present in nineteen and not present in four. In nine, the loss of strength was associated with loss of much weight, in three with little loss of weight, and in three with no loss of weight; in four further cases association with weight loss is undetermined. In the two cases which are reported as emaciated asthenia appears to have been pronounced.

It may be concluded therefore, that at least 8% of cases of pulmonary syphilis do not lose weight, and that at least 65% do. In point of frequency, wasting is present equally in males and in females (66.6% and 63.2% respectively in the series), but in point of degree, is greater in the latter, and having regard/

regard to the generally less bulk of the female, it may be said to be considerably greater in that sex. The ultimate loss of weight is approximately equal in cases of acute onset and in those of insidious onset, but is generally greatest in those cases which, following insidious onset and course, display an acute exacerbation of symptoms in general. Despite numerous statements to the contrary, loss of weight in pounds avoirdupois is generally considerable and may be marked, and further, no matter whether its progress be gradual or rapid, appears to be distinctly limited in degree; the loss ultimately sustained rarely exceeds 42 lbs. and actual emaciation is exceptional. General muscular weakness is a frequent accompaniment but may be present without associated loss of weight.

It is widely recognized that a moderate degree of fever, more or less loss of weight, and occasionally even night sweats may occur in visceral syphilis, but it is patent, from the frequency and degree of temperature, sweating, and loss of weight which occurred in the present cases of pulmonary syphilis, that these manifestations are a major feature of this particular localization of the general disease. It does not however follow, as a matter of course, that they are caused by the syphilitic process per se, and several writers have subscribed to the view that they are not thus/

thus of pure pedigree - Tylecote (110) considers the pyrexia to be due to associated bronchiectasis; Stanley (100) believes that pyrexia, sweating, and wasting, are caused by intercurrent or secondary infection, while Gibbes (38) expresses a similar opinion and commits himself further to the statement that when these are absent symptoms are negligible. Weber (116), with greater caution, states that the elevation of temperature may be either a true tertiary syphilitic fever or a complicating fever due to associated bronchitis and bronchiectasis with secondary infection.

Bronchiectasis was proved as a complicating factor in five of the cases in the series, and, while it must be admitted that one or other or more of the symptoms ascribed to this cause by Tylecote and by Weber were present in all five, they were equally and similarly present in thirty-four further cases none of which, despite radiological examination in twenty-four of their number, showed any clinical sign of bronchial dilatation. Granting even the supposition (unwarranted on the evidence) that bronchiectasis was indeed present, as is feasible, in all the cases which showed peribronchial fibrosis on radiological examination, there still remains a balance of twenty-five cases wherein the occurrence of these symptoms cannot be explained on this hypothesis. Nor can the sudden onset of fever, rapid appearance of sweating and loss of/

of weight, and the dramatic response to anti-specific treatment, be accounted for by a complicating condition, characteristically of gradual onset, which was shown radiologically in all five cases to be, in contrast to the symptoms in question, uninfluenced by anti-specific therapy.

Against the assertion that the cause of these symptoms is to be sought in the supervention of secondary infection, the case is not arithmetically so water-tight, but in countering a suggestion which affects the majority of cases it is reasonable to admit as evidence, opposing facts which apply equally generally in the group. It would appear thus, that secondary infection could not have been frequent in a series of cases which showed, on blood examination, a relative decrease of polymorphonuclear leucocytes, sputa characteristically mucoid and relatively free of leucocytes and pathogenic micro-organisms, and of which the symptoms and signs failed to respond to rest, diet, general hygiene and tonic treatment, even in the ideal environment of a sanatorium, but which commenced rapidly and continuously to improve on the exhibition of therapeutic agents which could have no influence on the organisms of secondary infection.

It is concluded that, in cases of pulmonary syphilis, the clinical manifestations of temperature, sweating, and loss of weight, are direct effects of the/
the/

the activity of the specific virus. That their frequency and intensity are so much greater in this particular localization of tertiary disease, is probably not unassociated with the general vascularity of the pulmonary lesions.

Of the nature and occurrence of temperature; sweating, rigors, loss of weight and muscular weakness in pulmonary syphilis, the outstanding points may be summarized in the following conclusions ----

---- In acute cases moderately high temperature is invariable from the outset and, in about half of these cases, is maintained during the first week of the illness; fever is decidedly uncommon in the early stage of insidious cases but develops gradually later; in a considerable number its later onset is sudden, and accompanies a general acute flare-up of symptoms; its characteristic ultimate type is a regular intermission with peak temperature probably usually in the late afternoon, but remittent fever and periodic bouts of pyrexia are not infrequent; an afebrile course is uncommon.

---- Rigors are common among cases of acute onset, but, in cases of insidious onset, are probably confined to those with later acute exacerbation and to those with periodic bouts of intermittent fever.

---- Sweats/

---- Sweats are common, frequently drenching, and occur particularly at night; they are definitely associated with the remission or intermission of temperature and occur especially in the cases of acute onset and in those of later acute exacerbation; they are long continued.

---- Loss of weight is frequent, occurs equally in the sexes, but is greater in females; the ultimate loss sustained is the same in acute and in insidious cases, but is considerably greater where acute exacerbation and rapid loss supervene upon insidious progress; the loss of body-weight rarely exceeds three stones and emaciation is exceptional.

---- General muscular weakness and fatigue are very common and may occur without associated loss of weight.

---- Temperature, loss of weight, and sweating, are not the result of secondary infection but are directly due to the activity, in the lung, of the *Treponema pallidum*.

PULMONARY CLINICAL SIGNS:

In the group of cases now under review, the signs of pulmonary disease were chiefly those demonstrable by percussion and by auscultation, but in approximately half of the cases some evidence was available/

available to inspection and palpation. In twenty of the forty-six cases unilateral diminution and delay of expansion were present; in two of these there was no effective inspiratory movement whatever of the entire left hemi-thorax, and associated with this, there were also diffusion and displacement of the apex beat to the same side and retraction of the rib inter-spaces. Apart from these two cases of which the visible signs may be rightly described as gross, retraction of the chest wall is only recorded in three further cases - all infra-clavicular. In the writer's cases there was no localized wasting of the muscles clothing the chest wall, and among those selected, with the possible exception of the three with infra-clavicular retraction, the wasting and myotatic irritability so frequent in tuberculous disease were not a feature.

DULLNESS:

Impairment of the percussion note is stated to be slight by Kirkwood (62) while Greer (46), who is in agreement, places more emphasis upon the occurrence of hyper-resonance in pulmonary syphilis. It is apparent from a study of the present series however, that dulness is a very frequent sign - it was absent in two, is not mentioned in five, and was present in thirty-nine. The diminution in resonance may be very localized - in two cases it was limited to narrowing of/

of Kronig's isthmus - or very extensive. On observing an arbitrary standard of "extensive dulness", implying impairment of at least the major portion of one lobe - the right middle lobe excepted - it is found that twenty-two cases can be grouped thus while seventeen may be described as having had "localized" dulness. In the former group the distribution was finely patchy and widely bi-lateral in four, and was more or less confluent in eighteen, involving the greater part of the surface area of one lobe in five cases, of two lobes in five cases, and of three lobes in four. In four further cases there was dulness of an entire lung - in all cases the left. It was the observation of similar extensive dulness in sputum-negative cases of supposed tuberculosis which fixed the attention of Wood on the possibility of a syphilitic aetiology as a factor of practical importance in disease of the lung (124).

The impairment of note displayed no specially favoured situation in the group. Hoffmann and his colleagues (55) state that the dulness is most intense posteriorly over the hilum of the lung, and that upward, downward, and laterally, there is improved resonance; in twenty-four of the present cases there was dulness in the interscapular region, but in only one of these was it localized to that area; in one of the writer's/

writer's cases which showed dulness over the hilum, impairment was continuous and marked, downward to the base and laterally toward the axilla. Vaccì and Rollet are quoted by Howard (56) to the effect that the dull areas of pulmonary syphilis are elliptical in outline; this observation does not appear to have been confirmed, nor to be supported by the evidence of any of the selected cases, while the areas of impaired note in the cases observed certainly did not conform in outline to this description. A marked degree of resistance appreciable to the pleximeter finger has been described by Gibbes (38). Very little information on this point is available in the records of the selected cases, but moderate resistance to the finger was appreciated in two cases, both of which subsequently yielded fluid on aspiration; a similar degree of resistance was noted by the writer in one case but in this instance exploratory puncture was negative.

In situation, outline, and character of the dulness there is apparently therefore, no exclusive or constant feature. It is stated however by Egdahl (26), and was noted by Gibbes (38), that impairment of resonance is a sign disproportionately prominent in comparison to the findings on auscultation. Of those cases in which dulness was "localized" there were seven in which the audible signs consisted mainly of harsh, granular, or distant breath sounds, with or without/

without scattered silibant rhonchi; moist sounds were absent. The remaining ten cases showed on auscultation, signs quite commensurate with those of percussion although in four, the area of impaired resonance was somewhat greater than that of the more striking stethoscope signs. Among the twenty-two cases with "extensive" dulness there were six in which auscultation yielded respiratory sounds mainly faint; in three of these there were no accompaniments and in two, very few. Major auscultatory changes were present in the remainder and in seven of these the percussion impairment was disproportionately extensive. It is apparent therefore, that the disproportion pointed out by Egdahl is true of 43% of the cases with dulness, but that it is evidenced more in a wider area of impaired note, than in any sharp contrast between the character of the signs elicited respectively by percussion and by auscultation. In the writer's experience, this is a finding common enough in non-specific lung disease and the conclusion is therefore reached that no diagnostic value attaches to such disproportion.

BREATH SOUNDS:

In nine of the selected cases it is not possible to arrive at the character of the breath sounds. Greer (46) states that there are slight changes, Howard (56) that there are minor alterations of pitch or intensity, Kirkwood (62) that they are rough/

rough or faint with prolonged expiratory phase or patchily broncho-vesicular, Hoffmann and his colleagues (55) that the breath sounds are usually absent but occasionally bronchial, and Powell and Hartley (51) that they are feeble with, superadded, a slight blowing quality while Stanley regards progressive weakening of the murmur as characteristic of pulmonary syphilis (100). The consensus of opinion is thus one of minor changes only, but with it an analysis of the series is in strong disagreement. Normal vesicular breathing was found in two cases; in seven the breath sounds were harsh generally, but in three of these there were areas of bronchial breathing, and in one, of broncho-vesicular breathing. Feebleness of the respiratory murmur was the sole alteration in six cases, but in one of these bronchial breath sounds ultimately developed. In three further cases the breath sounds were also mainly feeble, but small areas of bronchial breathing were apparent at first examination. In one case breath sounds were absent at first, but were bronchial in character at subsequent examination. In the remaining cases more obvious changes in the way of bronchial or broncho-vesicular breath sounds were the characteristic alterations noted. These signs were therefore ultimately present in twenty-seven cases - respectively in nineteen and in eight - so that in approximately 75% of the cases in which information/

information concerning the breath sound is available, a major alteration of this murmur was present, while minor changes of intensity and quality were the sole deviations from normal in eight cases only, and an unaltered breath sound present in two.

In two of the writer's cases in which bronchial breath sounds were present, the pitch was high and approached closely the tubular sound of lobar pneumonia; in one of the selected cases the breath sounds are reported as tubular, and in another as "almost tubular". Among the remaining cases the bronchial breath sound is stated to have been high pitched in two cases, and medium pitched in one; in twelve, the information is not available. Cavernous or amphoric sounds find no mention in the literature.

ACCOMPANIMENTS:

Whereas Powell and Hartley (51) state that there are few or no moist sounds to be detected in pulmonary syphilis, Howard (56) regards these as the most constant finding. Six of the present cases definitely had no adventitious sounds; dry [^]rales occurred in eight cases, in three as the sole accompaniment; moist [^]rales were present in twenty-six cases and constituted the sole accompaniment in nineteen; in five cases both moist and dry [^]rales were present. Other adventitious sounds were singularly lacking in the/

the group - friction occurred in three cases only; the observation, by Blakeman (5) and by Gibbon (39), of the rarity of friction sounds in this disease, has already been acknowledged.

Kirkwood (62) states that râles are not constant and that when present, are usually moist and coarse. In the series, the size of the crepitations varied - they were sub-crepitant in one case, fine in six, and coarse in nine; dry râles were almost entirely sibilant - six cases. In the recording of these signs the personal element which enters into the interpretation of the conventional terms provides, in the selected cases, an insurmountable difficulty, and the analysis in this particular is presented thus qualified. The writer's own experience justifies only the statement that moist sounds are frequent and may be fine or coarse, and that dry sounds are uncommon, few, and always sibilant. Some resonance of crepitation was present in one of the writer's cases and in five of those selected; of these latter, three had radiological evidence of bronchiectasis. The higher metallic consonances do not appear to have occurred in any of the cases. As Egdahl (26) states, accompaniments in pulmonary syphilis are not characteristic.

VOCAL FREMITUS AND RESONANCE:

As would be expected from the frequency of bronchial breath sounds, conduction to the thoracic wall/

wall of sounds set up in the larynx, was markedly facilitated in many of the cases. From the information available it is not possible in all cases to give a full separate analysis of the alterations in vocal resonance and fremitus. For this reason, and because of the palpable futility of treating individually these parallel signs, they are abstracted conjointly. The conduction of the vocal vibrations was increased in twenty-one cases, unchanged in eight, and is not ascertainable in fourteen. In two cases it was diminished and in one absent; in two of these latter pleural effusion was present. In eleven cases the increase amounted to whispering pectoriloquy; aegophony was noted in one of these but the presence of effusion was not proved.

Having regard to the foregoing, it is concluded of the local signs in syphilis of the lung that ----
 ---- diminution and delay of expansion are common; localized retraction, muscle wasting and myoidema are uncommon; displacement of the apex beat is rare and appears, from the signs which accompany it, to be due to collapse of the lung.

---- dulness is very frequent and may be localized or extensive, and confluent or patchy in its distribution; it has no characteristic situation, outline, or/

or character; in extent it shows, in common with other conditions, a tendency to be disproportionately greater than the auscultatory signs but there is no particular diagnostic value attached thereto.

---- the character of the respiratory murmur is rarely unaltered, and most frequently bronchial or broncho-vesicular, but may be harsh, granular, feeble or absent; the pitch of the bronchial sound is probably usually high; cavernous and amphoric sounds do not occur.

---- accompaniments are common, usually moist, fine or coarse, and occasionally slightly resonant; dry rales are much less common, few, and always sibilant; friction is a rarity.

---- vocal fremitus and resonance are usually increased, and the increase of the latter may amount to pectoriloquy; when diminished or absent the presence of pleural effusion has prior claim on possibility.

RADIOLOGICAL SIGNS.

Of thirty competent radiologists to whom the question was put, two only ventured to assert that it is possible to diagnose pulmonary syphilis from the X-Ray plate alone (46). Lisser (66), Hartung and Freidman (52), Egdahl (26), Douglas (23), and Howard (56), severally emphasize various appearances/

appearances, but are unanimous in the opinion that there is no exclusively unique radiological feature of the disease.

In the series reviewed twelve cases were not x-rayed. The radiological evidence of pulmonary disease in thirty-four cases is submitted below ----

---- Appearances indicative of consolidation of considerable portions of lung were noted in sixteen cases. These all showed more or less extensive opacities, continuously and homogeneously dense, and obscuring the shadows of diaphragm and / or ribs. Similar massive shadowing has been described by Burke (10), Shavlem (98), Blakeman (5), Walker (111), and Watkins (114). The area occupied by these dense shadows varied considerably in situation and extent - in three cases the entire left field was completely airless; in two the upper lobes only were involved - in one, both apices, and in the other, the medial half of the right upper lobe; in four the greater portion of the right lower lobe was so obscured; in one the right middle lobe; in three the greater part of the left lower lobe; in one the greater portions of right upper and lower lobes, and in two the greater portions of both lower lobes. Although Burke (10) states that the massive shadowing may involve a lobe completely, it is particularly noticeable of these cases/

cases that, excepting the three cases of whole lung involvement and one other, the appearances were those of extensive but incomplete lobar consolidation.

The area adjacent to the hilum has been named as the elective initial seat of this exudative shadowing, and the further statement made, that there is a fading off laterally toward the peripheral portion of the lung (Burke 10: Shavlem 98: Watkins 114: Walker 111.) The radiological appearances of only two of these cases conformed to this description; for the remainder, contiguity with the mediastinum or lateral lightening of the opacity cannot be claimed as characteristic and in three cases undoubtedly did not occur, the shadowing in these latter having been clearly peripheral and isolated from the mediastinum by translucent lung showing in one, moderate peribronchial fibrosis only. Extension of the exudative process outwards from the hilum could not have occurred in these cases, and moreover, in one case in which the opacity was contiguous with the cardiac shadow, a series of plates showed that progressive increase of the obscurity took place in an upward direction. Between the large areas of dense opacity and the adjacent normal or slightly fibrosed lung there was, in five cases, no sharp line of demarcation, the complete obscurity of consolidation giving place with hazy area of marginal transition to the good illumination/

illumination of normal or almost normal lung; in four of these five cases the outline, although thus vague, was smooth and regular in contour. Even in the case of single whole lobe involvement the dense shadow was not sharply outlined. In seven cases information as to regularity and character of outline is not available.

In two of the cases in which the entire left lung was completely obscured the apex beat had been noted at ordinary clinical examination to be displaced to the same side and slightly diffuse in character. In these cases and in one other the x-ray plate showed definite displacement of the mediastinum to the homolateral side.

In six cases numerous smaller areas of consolidation were apparent, from the presence on radiological examination of multiple, discrete, dense opacities of characteristically wide distribution - in two cases they were scattered throughout both lower lobes, in three cases throughout the entire field on both sides, and in one case they involved one lung from apex to base. The size of the individual nodules appears to have varied very little as in three of the selected cases they are compared to a walnut. In the single case of this type observed by the writer the nodules were rather larger, of approximately equal size, and rounded/

rounded, but not sharply outlined. In one other of the selected cases nodules were small, woolly in outline, and associated with diffuse haziness and definite moderate fibrosis, the whole presenting an appearance closely approximating to that of an acute military spread of tuberculosis. Hartung and Friedman (52) state that such a picture may occur in pulmonary syphilis while Burke (10) states that diffuse mottling may be present in association with slight fibrosis. In this group of six cases peribronchial fibrosis was present in two and was accompanied by moderate bronchiectasis in one.

Dense circumscribed opacities, single, and deeply situated in the lung, occurred in three of the cases. In one of these there was no other radiological abnormality; in one there was a massive consolidation widely separated from the isolated shadow while in the other there were associated peribronchial fibrosis and bronchiectasis. These opacities were situated, one in the lower part of the right upper lobe, one in the upper part of the left lower lobe and one in the right base immediately above the apex of the diaphragm. They were uniformly dense, sharply outlined, and varied in size from a "hen's egg" to an "orange"; their shape also varied - one is described as rounded, one ovoid, and one as roughly pyramidal. These shadows may confidently/

confidently be recorded as separate and distinct from the massive and nodular shadows already described; they differ not only in size, number, outline, and situation, but their slower response to treatment and their residual scarring, suggest a causal lesion more firmly entrenched and more destructive than that underlying the rapidly responsive and non-destructive consolidative lesions whose radiological appearances have already been considered. They are to be interpreted as the shadows of isolated gummata.

Fibrosis was present in fourteen cases of those x-rayed, unilateral in eight and bi-lateral in six. In seven of the cases it constituted the only radiological abnormality and was accompanied by bronchiectasis only, in three cases, in two by nodular consolidation one of them with bronchiectasis also, in one by a massive shadow, and in one by a gummatous shadow and bronchiectasis. The infiltration in those cases displayed the general characters of peribronchial fibrosis radiating from the hilum. According to Blakeman (5) this is the characteristic radiological finding in pulmonary syphilis. Hartung and Friedman (52), Burke (10), Watkins (114), and Douglas (23), describe a similar fibrosis as typical of some cases.

There is, however, nothing exclusive in this appearance and it is a very common radiological appearance of many/

many cases which are not syphilitic. The question therefore arises whether or not it is possible, in these fourteen cases of undoubted syphilis, to establish in this fibrotic appearance, any features of more distinctive character. In the group there were three which, in the writer's opinion, may have this value. These are ----

---- a dense, fibrotic, squat, wedge-shaped shadow in the lung root with base towards the mediastinum and from the apex and free sides of which, thick finger-like fibrous processes pass outward into mid-lung. This appearance was present in two of the writer's cases which showed only fibrosis in the lung field. A similar radiological picture is described by Burke (10).

---- a marked tendency toward a greater density of the fibrosis in a direction steeply downward. This was present in two of the selected cases and is an appearance closely akin to Schroder's description, quoted by Orsagh (80), of plug-like shadows descending from a widened hilum and regarded by him as characteristic. Lisser (66) reports a somewhat similar shadowing of the cardio-hepatic angle.

---- outward extension from the hilum of moderately dense fibrotic processes reaching, with little diminution in density or size, to the absolute periphery, and associated with thickening of the pleura, costal and/

and interlobar, an appearance present in its entirety in one case, and present without the pleural thickening in two further cases.

Marked enlargement of the hilar glands was present in five of the cases - in three associated with the massive shadows already described, and in two with multiple diffuse nodular infiltrations. Orsagh (80) states that enlargement of the thoracic glands in late syphilis is not common, but quotes Scharl's demonstration of cases with specific enlargement of the hilar glands and associated general symptoms of tuberculosis.

Pleural thickening was present in two cases; in one it was associated with fibrosis radiating from the lung root and has already been described. The remaining case showed considerable thickening of the pleura with slight reduction of the interspaces and with, in the lung, an associated massive shadow. Burke (10), Hartung and Friedman (52), and Watkins (114), describe similar appearances. Only one of the cases in which pleural effusion developed was examined radiologically; the effusion was small in amount rising only slightly from the costo-phrenic sinus. The associated change in the lung field was a massive exudative shadow.

FURTHER/

FURTHER APPEARANCES AND PERTINENT NOTES:

In the single case of fibrosis radiating to the periphery associated with pleural thickening there was also visible, deeply situated in the lower lobe on the same side, a shadow, dense, sharply defined, and with short radial spikes, apparently cast by a nodule of insular fibrosis. In the cases of isolated gumma in which the progress of resolution was observed by further radiological examination, the ultimate result of treatment was a dense scar throwing a similar shadow, and it seems probable that the isolated shadow seen at first examination of the present case represented a gumma spontaneously healed.

A moderate degree of bronchiectasis was present in five cases; the dilatation was associated with considerable hilar and peri-bronchial fibrosis in all the cases and was accompanied by further appearances in two. In four cases the condition was confined to the bases and in the remaining case, involved the bronchi of both upper and lower lobes.

Van Hauseman (quoted by Forman 30) states that deposition of lime salts never occurs in gummata of the lung, and the absence of any appearance of calcification in pulmonary syphilis is stressed by Hartung and Friedman (52) and by Tylecote (110). Radiological evidence/

evidence of calcification in root glands was present in two of the cases in the series but a similar change does not appear to have occurred in the pulmonary lesions proper; calcification was not apparent in any of the writer's cases and was definitely not present in six of those selected. In the remaining cases the presence or absence of calcification is not stated, but as the radiological reports of the majority are very fully given, it is unlikely that it was apparent in them and probable that absence of calcification is a definite feature of untreated pulmonary syphilis. The qualification is made advisedly, as the ability of mercury and bismuth to facilitate the deposition of lime salts is well known and, in regard to the latter drug, is exemplified in the present series.

Radiological examination revealed the presence of aortitis in three cases. Definite aneurysmal dilatation was present in one but was slight and insufficient to exert any appreciable pressure on neighbouring structures; in the cases of the two others, the widening of the aortic shadow appears to have been minimal. Apart from the lateral displacement already mentioned there were no additional radiological abnormalities associated with the mediastinal structures, but it appears possible that the heart shadow may be of some value in differential diagnosis, as/

as, despite the long and frequently hectic course of the disease, the pendulous cardiac shadow of many tuberculous individuals was not seen by the writer in any case, and finds no mention in twenty-nine reports; in the advancement of this suggestion indebtedness to an original observation by Tylecote (110) must be acknowledged.

Shavlem (98) states that x-ray examination in syphilis of the lung may be entirely negative, but it is noteworthy of the present series that in all thirty-four cases radiologically examined definite abnormalities of one kind or another were seen although, in two of the cases, ordinary clinical signs were completely absent, and in four, were of the vaguest description. It seems probable therefore, in contradistinction to its value in the exclusion of tuberculous disease, that negative radiological examination is strong presumptive evidence against the presence of pulmonary syphilis.

In view of the evidence afforded by thirty-four cases it is reasonable to conclude of the radiological appearances in pulmonary syphilis that ----

---- they have no exclusively unique characteristics which provide, with certainty, a short-cut to diagnosis.

---- dense/

---- dense shadows indicating extensive but usually incomplete lobar consolidation occur in approximately 47% of cases; they may completely obscure an entire lung, frequently the left, and, in the majority of such instances, are accompanied by signs of pulmonary collapse; these opacities have no particular situation or direction of evolution; their outline is smooth and regular but not sharply demarcated.

---- multiple nodular opacities scattered throughout one or both lungs are to be seen in approximately 18% of cases; they are generally of walnut size but may be slightly larger, or much smaller, and, their outline being hazy, they may, in the latter event, provide a picture not dissimilar from that of acute military spread of tuberculosis.

---- dense, circumscribed, isolated, single opacities, deeply situated in the lung, and cast by classical gummata are rare; they are uniformly dense, rounded, ovoid or angular in outline; they are slow of resolution and leave behind, in the shape of a scar, radiographic evidence of their former presence and destructive nature.

---- pulmonary fibrosis is apparent in the x-ray plates of approximately 41% of cases; in one half of these cases it constitutes the only visible abnormality; it has the general appearance of peribronchial distribution but may show particular characteristics of/
of/

of some diagnostic value.

---- enlargement of hilar glands is apparent in some 15% of the cases; it is associated with other appearances in the lung field probably always exudative opacities, either massive, or multiple nodular.

---- pleural thickening is uncommon.

---- isolated shadows cast by fibrotic scars may occur and are probably due to previous gummata spontaneously healed.

---- bronchiectasis is visible in 15% of cases and is always associated with considerable hilar and peribronchial fibrosis; it is usually basal only, and moderate in degree; gross bronchiectasis secondary to tangible obstruction does not occur.

---- calcification in root glands is not common; in this situation it may or may not depend upon syphilis, but in untreated pulmonary lesions of undoubted specific nature, calcification does not occur; after treatment with bismuth, and possibly with mercury, radiological examination may demonstrate deposition of lime salts in the pulmonary lesions.

---- aortitis may be present as a concomitant appearance in a few cases; it is very probable that the small, dropped, pear-shaped heart of pulmonary tuberculosis does not occur in pulmonary syphilis even though the general pattern of illness may be hectic.

---- a negative radiological examination is very strong evidence of the absence of syphilitic affection of the lung.

THE WASSERMANN REACTION AND OTHER EVIDENCE OF
SYPHILITIC INFECTION.

For more than one reason it is much simpler to withdraw a little blood than to probe the history or search meticulously for evidence of syphilitic infection, and it is natural first to give attention to the serum reactions of the present cases.

In the entire series the Wassermann was positive in thirty-four cases and was strong positive in twenty-seven of these; in two cases the reaction was definitely partial while in the remainder its degree is unstated. In four cases the reaction was negative and in one of these, in which there were no stigmata of syphilis, three different antigens were tried with still negative results; in one there were very definite signs of locomotor ataxia; in one a periosteal gumma and a strong positive reaction later developed, while in the fourth the reaction was positive when run again after a provocative injection of arsenic. Out of thirty-six cases therefore, the nett result is two negative sera and thirty-four positive.

In ten cases the results of serum reactions are not given. One case gave a history of infection two years before, and two, a history of infection respectively five and six years previously; both these latter had tertiary lesions of palate and larynx. In six cases/

cases there was no admission of infection but in two there was clear evidence of locomotor ataxia; one had an extensive nodulo-cutaneous syphilide; one had specific ulceration of the mouth and throat; one had bilateral painless arthritis of the knee, suspicious scars on the forehead, and a history of repeated miscarriage, while the sixth showed the scar of a primary sore and palpable epitrochlear glands. In one only of those with negative serum, and in one only of those whose serum reaction is undetermined, was there no suggestive sign, so that the evidence of constitutional syphilis in the series was thus very complete.

The information provided by the Wassermann reaction indicated the presence of syphilitic infection in, ultimately, thirty-four of the cases. The limitations of the reaction as an aid to diagnosis of the nature of particular lesions require no reiteration, but in the present series there appear to have been only sixteen cases in which diagnosis necessarily depended to any extent upon it. The remaining cases afforded clinically some indication, not merely of the existence but also of the activity, of an infection which could not but be suspected as syphilitic. In six cases there was a history or residual sign of such lesions more or less immediately antecedent; in one of these an active concomitant syphilitic lesion was/

was also present, while a second developed a distant tertiary lesion after the pulmonary condition had been under observation for some time. In twenty-three cases there were present, at the time of examination, conditions either manifestly syphilitic or strongly suggestive of syphilis; in one of these a recently healed specific lesion was also apparent, while another developed, subsequent to the appearance of the lung condition, a further specific process. In four cases tertiary lesions developed elsewhere after the pulmonary condition had already commanded attention; in one there had been antecedent tertiary syphilis and in a second a similar active lesion was already present. With, in brackets after each, the number of cases in which the condition was found, these varied syphilitic lesions were presented by thirty of the cases as follows ---- enlarged epitrochlear glands (7); enlarged posterior cervical glands (5); ulcers of mouth, palate, or tonsil (6); subcutaneous gumma (3); central nervous disease (4); syphilitic laryngeal perichondritis (5); periosteal gumma (3); periostitis and endosteitis of tibiae, fibulae, clavicles or ribs (3); nodulo-cutaneous or rupial syphilide (3); aortic disease (3); arthritis (1); teno-synovitis (1); iritis (1); testicular gumma (1). In addition to these, four of the female cases gave a history of frequent miscarriages and a fifth, a history of early infant/

infant deaths. In two cases there was enlargement of the liver but whether or not this was of syphilitic origin is not determined.

The likelihood of these concomitants in pulmonary syphilis has been pointed out by Shavlem (98), Blake-man (5), Douglas (23), Landis and Lewis (64), Gibbes (38), Funk (36), Fowler (32), and Witherspoon (123), while other authors lay particular emphasis on the occurrence of certain lesions - Tylecote (110), Orsagh (80), and Post (86) stress the central nervous lesions; the last-named writer, Gibbes (38), and Howard (56) quote cases. Bauch (2) and Orsagh (80) emphasize the occurrence of aortitis, while Egdahl (26) points out the possibility of enlargement of the liver; the incrimination of liver disease in the causation of pain has already been discussed. It is unlikely that there is any particular predilection and the series merely shows that a wide variety of concomitant syphilitic lesions is to be expected and that, apart from selective adenopathy, mouth, larynx, and central nervous lesions which show a slightly favoured incidence, they are of fairly even distribution. One third of the cases showed no objective concomitant disease although this may have been present; Pryor (87) observed a series of fifteen cases seven of which, in whom there were no signs of syphilis elsewhere, had subjective phenomena/

phenomena which responded to the test of anti-specific treatment, while in one of the writer's cases there was severe nocturnal headache which ceased on the exhibition of iodides.

From what has been set forth in the foregoing section the conclusions may reasonably be drawn that ----

---- the Wassermann reaction in cases of pulmonary syphilis is almost always strongly positive; partial and negative reactions are most unusual.

---- diagnosis of the systemic infection in fully two thirds of these cases does not of necessity hinge upon the serological examination, there being in that proportion, either in the past history or present condition, ample clinical evidence of the presence and activity of the syphilitic virus.

---- concomitant tertiary lesions are thus both numerous and varied and an individual case may show several; it is possible that those of glands, mouth, larynx and central nervous system are most frequent; miscarriages and early infant deaths figure prominently in the previous history of female cases.

---- in the absence of objective concomitant syphilis certain subjective complaints may give a clue to the constitutional disease.

OTHER CLINICAL FEATURES.

Apart from symptoms directly associated with the lung disease and those arising from concomitant syphilitic lesions, other symptoms were scanty. A curious lack of proportion between the extensive clinical signs and the severity of the pulmonary symptoms on the one hand, and the good appearance of the patients and lack of general symptoms on the other, is, in the writer's experience, one of the outstanding characteristics of the disease. Despite continued fever, pain, dyspnoea, and severe cough, some of these patients appear to retain a remarkable degree of general well-being and, indeed, do not look very ill. This disproportion was present in three of the writer's cases and in eleven of those selected. It is apparent from a consideration of the fever, sweats, loss of weight, and muscular weakness, that the general condition must, and does suffer, but the deterioration is not reflected in the general appearance or, excepting muscular weakness, in the subjective sensations of the patient; this curious aspect of syphilis of the lung appears to be frequent as it has been remarked by Hartung and Friedman (52), Burke (10), Howard (56), Tylecote (110), Robertson and Robertson (91), and Lisser (66).

In various terms the impression is conveyed of seven cases that there was visible pallor of the face; pallor was noticeable in three of the writer's cases but, although the blood showed a degree of secondary anaemia, the alteration of complexion was not striking. Douglas (23) reports a case - not jaundiced - in which there was a slightly greenish complexion, while Powell and Hartley (51) stress the earthy lustreless pallor of the tertiary syphilitic patient.

Similarly, notwithstanding the very frequent and considerable loss of weight, the description "well-nourished" occurs in nine of the twenty-six selected cases which lost weight, and in three of the twelve in which the fact of loss of weight cannot be established, while, although all but one had lost weight, none of the writer's cases were obviously wasted. Two cases only of those selected merited the description "emaciated".

In the series, symptoms additional to those already described were few; they comprised gastric disturbance, nervousness, amenorrhoea, and hoarseness.

Kirkwood (62) states that appetite is indifferent and digestion impaired, while a discussion which followed/

followed a paper by Douglas (23) brought out a considerable incidence of gastric disturbance in pulmonary syphilis. Three of the writer's cases lost appetite and this is stated to have been poor, lost, or impaired, in six of those selected. Including these latter, ten of the cases had digestive disturbance; this appears to have been vague in the majority of the cases - one case only had definite epigastric pain, irregular, and occasionally inducing vomiting. In one case persistent dyspepsia was an initial symptom but was soon followed by cough and chest pain; in the remainder the dyspeptic symptoms were early in five cases and late in four; localizing pulmonary symptoms preceded the digestive upset in all these cases, so that in the entire series, only one case presented an initial period of gastric disturbance unaccompanied by symptoms which would focus attention upon the lung. The dyspepsia appears to have little bearing upon loss of weight; of the ten cases the available information is to the effect that one lost no weight, two little weight, one eighteen pounds and one thirty pounds; persistent fever in the latter case probably had a greater influence on the loss of flesh than had the vague dyspepsia.

Hoarseness is included among the symptoms of pulmonary syphilis by Greer (46). In the series, this symptom/

symptom was present in four cases and in three of these there was concomitant specific disease of the larynx; the presence of hoarseness in two further cases of laryngeal involvement is not stated but may be taken for granted. Further information of the remaining case is not available but the suggestion is clear that hoarseness, when it does occur in pulmonary syphilis, is due to concomitant disease of the larynx and not, as is common enough in the early history of pulmonary tuberculosis, to a non-specific (i.e. non-tuberculous) laryngitis. In its combination with concomitant disease of the larynx, pulmonary syphilis provides a clinical picture little dissimilar from one usually associated with phthisis.

Nervous irritability and insomnia are stated by Kirkwood (62) to be marked accompaniments of pulmonary syphilitic disease; they do not appear, however, to have been noted by other recent contributors to the literature, and are not reported in any of the selected cases. Three of the writer's cases slept badly but the cause - severe pain in two, and troublesome nocturnal headache in one - was apparent. There is thus no evidence in the series to suggest that the watchfulness and nervous symptoms noted by Kirkwood are either frequent or, of themselves, characteristic manifestations in the symptomatology of this disease.

Amenorrhoea was present in only one case in the series although the ages of the females lay, with one exception, between the limits of twenty-two and forty-three years; the remaining case was aged forty-six years and therefore not outwith the usual span of sexual activity. To the writer's knowledge the occurrence of amenorrhoea in pulmonary syphilis is not remarked upon by any author.

PULSE:

No characteristic change was noted in the pulse of any of the cases; the pulse rate in the writer's cases was commensurate with the temperature elevation, and in all the selected cases in which the information is available a similar relationship was maintained.

Tylecote (110) states that the blood-pressure is usually normal or slightly raised in pulmonary syphilis and contrasts this with the lowered pressures of tuberculosis. Orsagh (80) quotes Godliosky to the same effect while Burrell (11), dealing with syphilis in its relation to the development and diagnosis of pulmonary tuberculosis, states that pressure tends to rise rather than fall. The relevant information is scanty in the cases selected and the writer's cases are all too few but the available data are tabulated below ----

Cases	i	ii	iii	iv	v	vi	vii	viii	ix
Age	22	32	37	43	46	57	42	56	?
Pressure									
Systolic	110	130	135	160	155	155	120	185	130
Diastolic	68	85	90	100	95	?	?	110	?
Duration of lung disease in months	4	16	12	22	5	?	25	19	20
Presence or absence of aortic disease	-	-	-	+	+	-	-	+	-

The table shows that blood-pressure was within the limits of normality in relation to age, in four cases, was raised in three, low in one, and not definitely ascertainable in one. It is to be noted also that all three cases in which there was raised pressure had demonstrable aortic disease. If Burrell is correct in the statement that blood-pressure tends to rise it might be expected to bear some relationship, more or less direct, to the duration of the pulmonary disease; this does not appear to be so. Indeed, the pulmonary condition in the case with definitely low pressure had run for twenty-five months, and, in the case of unknown age and of twenty months duration, it is improbable that the systolic pressure of 130 mm. Hg. was a raised reading. It would appear therefore, that although the blood pressure may occasionally be low it is usually normal or raised; and further that those cases with increased pressure are of an age period when such/

such increase is not uncommon; and finally that the evidence points, not to the pulmonary syphilis, but to concomitant arterial disease as the cause of any increased tension.

BLOOD EXAMINATION:

The remarkably good appearance of these patients has been remarked upon. Some obvious pallor does, however, appear to be not infrequent. The descriptive use of the term "anaemic" occurs in the reports in relation to four cases, while two are described as "pale", and one as "very pale". Pallor was noticeable, additionally, in three of the writer's cases. Orsagh (80) states that examination of the blood is of little value in diagnosis but that lymphocytes and eosinophils may be relatively or absolutely increased. Denman (21) quotes a case, with a leucocyte count of 17,200, in which the red count fell to 2,800,000. Greer (46) reports slight secondary anaemia and a normal white count - absolute and differential; Witherspoon (123), slight secondary anaemia and moderate leucocytosis, and Roussel (94), a moderately severe secondary anaemia with considerable absolute and relative increase in lymphocytes. Apart from this information the literature has proved consistently uninformative and the same must be admitted of the individual/

individual case reports selected. In four of the cases personally observed clinical examination of the blood was carried out; the results obtained are set out below ----

R.B.C.	Hb.	W.B.C.	Monos.	Polys.	L L	S.L.	Eos.
4,640,000	90%	12,400	0.5	56.0	8.0	34.5	1.0
3,750,000	65%	18,800	0.5	62.0	12.0	24.5	1.5
3,840,000	70%	15,200	0.5	54.0	6.5	37.5	1.5
3,460,000	65%	16,200	1.0	48.0	8.5	40.5	2.0

---- and show the constant features of secondary anaemia and leucocytosis.

CYANOSIS:

Only three of the selected cases had any cyanosis; in two, it was present definitely only in the hands and wrists; while further information of the third case is lacking, it would appear, from the context, that the suffusion was facial.

Concerning these various additional clinical features the evidence points to the following conclusions ----

---- There/

---- There is, in many cases of pulmonary syphilis, a lack of balance between the severity of local symptoms and extensive pulmonary signs on the one hand, and the good general appearance and apparent well-being of the patient on the other.

---- Visible facial pallor is not uncommon but is rarely marked.

---- Despite frequent, and often considerable loss of weight, many of these cases look well-nourished; obvious emaciation is rare.

---- Loss of appetite and vague digestive upset are not uncommon; they are minor disturbances and have little influence on weight loss; dyspeptic symptoms may be early or late but are rarely initiating.

---- The occurrence of hoarseness is governed entirely by the incidence of concomitant syphilitic disease of the larynx; the association of syphilitic pulmonary and laryngeal disease constitutes a clinical picture likely to be mistaken for tuberculosis.

---- Nervousness and insomnia are exceptional; the latter is probably always dependent upon some definite cause.

---- The rarity of amenorrhoea in pulmonary syphilis contrasts with its frequent occurrence in tuberculous disease.

---- There is no characteristic alteration of pulse; arterial tension may occasionally be low but is usually normal/

normal; if raised, the increase is due to concomitant arterial disease and not to the pulmonary syphilis.

---- Cyanosis is uncommon and slight.

---- The blood picture is not diagnostic; it is usual to find moderate secondary anaemia with approximately parallel reduction of cells and haemoglobin, and colour index below unity; there is a fairly constant leucocytosis; differential enumeration of white cells shows relative diminution of polymorphonuclears and relative increase of small lymphocytes, with variation of eosinophils and large lymphocytes within normal limits.

CLASSIFICATION OF CASES:

"In its various forms " "syphilis of the lung may present itself with a " "clinical picture of any phase of pulmonary disease " "(121). A wide variety of pulmonary conditions are undoubtedly reported in the literature as syphilitic but, in the great majority, upon but slender evidence which, when critically examined, resolves itself into the mere association of pulmonary disease with constitutional syphilis. The natural result of such unbridled enthusiasm has been that many of the published classifications appear, octopus-like, to embrace a considerable/

considerable number of conditions, the specific aetiology of which is at best problematical.

Although it is admitted of the majority of the present cases that they are from this same barrel of red herrings, they are the survivors of an exacting selection based upon personal experience of the minority, and have been analysed with confidence as authentic examples of pulmonary syphilis. Their symptoms and signs are already sufficiently set forth to convey some idea of the clinical features of the condition; nothing is to be gained by reiteration and it is best to classify only those cases which were subjected to radiological examination, and to do so upon the interpretation of the appearances thereby obtained, together with the general type of the accompanying clinical signs. It appears therefore, and is concluded, that syphilis of the lung may manifest itself in the following clinical varieties; these, in their order of frequency, are -

1. Incomplete lobar consolidation with atypical signs of pneumonic type.

2. Peri-bronchial fibrosis with clinical signs vague and essentially bronchitic.

3. Multiple nodular consolidation with signs of broncho-pneumonic type.

4. Massive consolidation with signs of collapse.
5. Hybrid forms which consist of peribronchial fibrosis plus one or other of the consolidative varieties.
6. Isolated gumma with very vague or no clinical signs.

COMPLICATIONS.

HAEMOPTYSIS:

Haemoptysis has been shown to be so much a symptom of pulmonary syphilis that it is only justifiable to include it also as a complication, in that, although usually minimal, it may occasionally be moderately large, or severe and even fatal. Definite small haemorrhages occurred in three of the cases and a moderately sharp haemorrhage in one. Hawes (53), Wood (124), and Remsen (89), report similar cases while Hoffmann, Rosenbach and Aufrecht (55) quote others from Lancereaux and from Carlier. Apart from the rarity of a fatal issue, haemoptysis does not assume a very forbidding aspect in the role of complication. In the four cases mentioned there was no deterioration in general condition or increase in local signs consequent upon the bleeding - a sequence of/

of events common in tuberculous disease.

Fatal haemorrhage is distinctly rare and the literature so far as covered yields only three cases - reported by Fowler (32), Remsen (89), and Goodhart (41) - in two of which the bleeding had occurred by rupture of a pulmonary arterial branch in a small cavity of the lower lobe.

PLEURAL EFFUSION:

Pleural effusion occurred in three of the forty-six cases. McIntyre states that involvement of the pleura is frequent and that effusion occurs early (70). A high incidence of pleural effusion does not appear to be proved, although the available figures do suggest that, when evident pleural involvement is present, the development of effusion is likely. In the present group of cases there were nine in which the pleura was involved - in one there was old-standing thickening and retraction; in one "radiological" thickening; in two fibrinous pleurisy only; in three effusion was present, and in two the disease process extended to the thoracic wall and must have involved the pleura. Egdahl (26), in an analysis of thirty-five cases, found ten in which pleurisy had been present, in four with effusion; Wile and Marshall found a similar number in a review of fifty cases (121).

In the three cases from the present series the quantity/

quantity of pleural fluid was small in two, and large in one. In two cases the aspirated fluid was dark straw-coloured and in the third, blood-stained; subsequent spinning suggested that the bleeding in this case was fortuitous in its occurrence. A slightly retractile clot developed on standing in two cases; coagulation is not mentioned in the third. Cytological examination of the fluid in two cases showed lymphocytes and endothelial cells. In the third case the cells were differentially counted with the result - Polymorphonuclears 54%, Lymphocytes 24%, Endothelial cells 22%. Additional information regarding sero-fibrinous effusion in cases of pulmonary syphilis is not forthcoming, but it is worth recording that Orsagh (80) states that it is occasionally possible to recover the *treponema pallidum* from the pleural fluid, and that the Wassermann reaction may be stronger in the exudate than in the blood. With regard to the diagnostic significance of the latter observation, Orsagh further states that Leon Bernard was enabled thus to demonstrate the syphilitic nature of a pleural effusion in a definitely tuberculous individual.

In relation to the development of effusion in pulmonary syphilis, McIntyre (70) quotes the demonstration by Letulle of the passage of caseous material into the pleural space. A purulent exudate is therefore a possibility and an instance is reported by Forman/

Forman (30) in a case which came ultimately to post-mortem diagnosis. Purulent effusion did not occur in any cases of the present group and the literature does not yield a single pure case occurring in acquired syphilis - there is one of pyo-pneumothorax, and Falconer's case was a congenitally syphilitic adolescent of twenty. It is reasonable to conclude that, although possible, the occurrence of purulent effusion in the acquired disease must be extremely rare.

PYO-PNEUMOTHORAX:

According to Howard, pyo-pneumothorax was observed by Roubier and Bouget, and was shown by them to have arisen by rupture of an area of syphilitic broncho-pneumonia (56). Bauch (2) describes a case of partial pneumothorax, but a purely syphilitic aetiology does not appear, in the writer's opinion, to have been proved; the case showed a great deal of destructive lung disease while no improvement followed the prosecution of active anti-specific treatment over a period of eighteen months.

EXTENSION TO THORACIC WALL:

This unusual event transpired in two cases both of which displayed the common features of acute onset, rapid febrile course, and extensive consolidation of the lung. In both cases swelling appeared on the surface; in one it was flat, immobile/

immobile, firm, not tender, fluctuating, or discoloured, and not accompanied by local temperature; in the other the skin over the swelling became boggy, reddened, and finally broke down, with evacuation of a quantity of pultaceous material. In both cases there was clear evidence of syphilitic infection and of consolidation of the underlying lung. The obvious pitfalls of empyema necessitatis and actinomycosis appear to have been ruled out in the case which broke down, while in both cases the response to anti-specific treatment was immediate, spectacular, and complete, the deep pulmonary lesions improving "pari passu" with the visible surface condition. Although a somewhat remarkable one, the complication appears to be definitely syphilitic in origin, the superficial lesion arising by direct extension of the specific process to the thoracic wall.

HYPERTROPHIC PULMONARY OSTEO-ARTHROPATHY:

The reports and publications drawn upon have not yielded a single case of pulmonary syphilis in which the more severe degrees of this condition supervened. One case only of the series showed slight clubbing of the fingers, an indication of rarity which is paralleled by Egdahl who found but one similar example in a group of thirty-five (26). Parkes Weber (116) and Pilton (85) each record a single case; in the former instance the usual advanced pulmonary fibrosis/

fibrosis was present, while it is doubtful, in the case of the latter, if the lung condition was truly syphilitic. It is apparent that even minor osteo-arthritis is rare in pulmonary syphilis.

ABSCESS AND GANGRENE:

Suppurative and gangrenous processes are included by the Karshners in their classification (59) while Easton, quoting from Dieulafoy, states that syphilitic gangrene of the lung has been demonstrated post-mortem (25). Whilst it is theoretically possible for abscess formation to arise by secondary infection of a syphilitic lesion, whether caseous or not, and possible also that the marked regional arteritis of the syphilitic disease might be a factor contributing to gangrene, the fact is indisputable that few instances of such complications have been recorded. Gibbes (38), Easton (25), and Thompson (105), report cases of abscess in undoubtedly syphilitic subjects, but of none of these can it be said to have been shown that pulmonary syphilis definitely preceded the suppurative process.

The presence of spirochaetes in the wall of a pulmonary abscess cavity has been demonstrated but their identity with the spirochaete of syphilis does not appear to have been established (33). Moreover, it is now recognized that a variety of spirochaetes are/

are to be found in many pulmonary conditions of greater or less severity (Castellani 15; Thomson 106; Scott MacFie 69; Harper 50), and that their vulnerability to anti-specific treatment is such, that no deduction of a syphilitic aetiology can be based upon the response to these measures. While there is no justification for a categorical denial of the occurrence of abscess and gangrene in pulmonary syphilis, the conclusion is irresistible that these have not been proved. Abscess secondary to bronchial syphilis is not at present under consideration.

BRONCHIECTASIS:

Moderate bronchiectatic dilatation occurred in five of the cases in the series, an incidence of approximately 11%. The condition was present in 13% of the Karshners' series (59), and further examples are reported by Bryce and Paterson (7), Munro (76), Stanley (100), Winfield (122), Pye-Smith (88), MacKenzie (71), and Thornton (108). Numerous further references are given by McIntyre (70). In all five of the present cases in which the condition developed, the chief change in the lung was fibrosis peribronchial in distribution, and, among the cases of this type, their duration was the longest; the bronchiectasis would appear thus to be secondary to the peribronchial disease aided probably by the long continuance of cough/

cough. Shavlēm (98) suggests that it is due to gummatus pressure upon, or secondary stenotic contracture of the bronchi, or to pleural thickening and adhesion; such mechanical interference with pulmonary drainage is a frequent factor in gross bronchiectatic dilatation but it was absent in the present cases, and does not therefore appear to have any influence in the causation of the very moderate degree of dilatation which occurs in pulmonary syphilis.

The complication was not a serious one, the cases differing little from those in which it did not occur; sputum was increased in amount and purulent or mucopurulent, but marked postural cough and layering of the sputum were not features; foetor occurred in two cases only. The condition was partly amenable to treatment, but was responsible for the continuance of slight symptoms in all the cases.

Of the complications of pulmonary syphilis it may be concluded ----

---- moderate haemoptysis occurs in some 10% of cases; it is of little significance; fatal haemoptysis is extremely rare.

---- pleural effusion occurs in approximately 6.5% of cases; it is usually small and serofibrinous; bacteriological and serological examination of the fluid/

fluid may be of some value in diagnosis; cytological examination is not distinctive; purulent effusion is possible but as a rarity only; pyo-pneumothorax is very rare.

---- extension to the thoracic wall occurs in approximately 4% of cases.

---- clubbing of the fingers is rare; more advanced degrees of osteo-arthropathy do not occur.

---- abscess and gangrene are unproved.

---- bronchiectasis of moderate degree occurs in some 10-15% of cases; it is not due to gross obstruction of bronchi.

---- none of the more common complications are of any grave prognostic significance.

CLINICAL COURSE.

In various terms, Hartung and Friedman (52), Blakeman (5), Douglas (23), and Egdahl (26), describe the course of pulmonary syphilis as characteristically slow of progress and chronic in duration. In what follows the cases observed and those selected are considered conjointly.

Concerning the present cases it has already been noted that, although the usual early progress of symptoms/

symptoms was insidious, an acute mode of onset was not infrequent. There was, however, no acute course terminating in early death or in spontaneous recovery; from analysis of the cases there is no doubt that, whatever the type of onset, the subsequent course of the disease is chronic. It is possible, in twenty-six cases of insidious onset, to arrive at an exact or closely approximate idea of the previous duration of the illness at the time of diagnosis; among these it is found, in ten cases, that the history extended to less than six months, and that, in fourteen cases, the previous duration of symptoms was two years or more - maximum, seven years; the average duration of the insidious cases was 24.8 months. As would be anticipated there was a shorter average history in the cases of acute onset wherein the early symptoms, by their very nature, had greater command upon serious consideration; among these, statement of the duration of illness previous to diagnosis may be ventured in eight - in four, this was less than two months, and in the remaining four, was respectively five, eight, sixteen and twenty-four months; average duration of eight acute cases - 7.2 months.

In the treatment of the individual clinical manifestations some indication of the progress of each has been given. Regarding the general march of the condition/

condition, it may be said of twelve cases of acute onset, that early progress was rapid, that four subsequently lapsed into stationary chronicity, and that three continued slowly to lose ground. In four, early diagnosis and treatment leave to speculation the end-result which "might have been"; the subsequent general progress of one case is not clear. All thirty-four cases of insidious onset appear generally to have made steady progress toward gradual worsening of the clinical condition; at the time of diagnosis this was continuing in at least fourteen, while twelve had attained a stationary condition.

A relapsing course has been described by Bryce and Paterson (7); they instance it particularly by one case which, before a fourth and final bout of illness, had had similar attacks at intervals of eight, five, and two years previously. Although it has already been shown of certain clinical manifestations, that a periodic tendency was not uncommon, it cannot be said of any cases that the symptoms, as a composite whole, pursued a relapsing course such as has been described by Bryce and Paterson. True relapse after treatment did however occur and is dealt with elsewhere.

The supervention, following an insidious course, of an acute exacerbation of symptoms appears to be a not/

not infrequent feature of pulmonary syphilis. In the Present series this event transpired in eleven cases. In all but one of these it appears to have been a late occurrence, and in eight cases can be dated. In one case the acute exacerbation ensued after a "few months"; in seven cases the average period preceding the acute flare-up was 3.5 years. When this figure is compared with the average total duration of insidious cases, it becomes apparent that the event is a feature mainly of the longer-enduring cases. The acute exacerbation was a very definite occurrence with, generally, sudden onset or exaggeration of pain, fever, dyspnoea etc., and rapid further loss of weight. There is a distinct similarity between the acute onset and the acute exacerbation, not only in symptoms but also in local signs - in all the cases of acute onset, consolidative lesions were present; similar lesions, massive or nodular, were present in seven of the cases of acute exacerbation, and were accompanied by pleural effusion in two.

It appears from the literature, and has been noted among the present cases, in relation both to individual clinical manifestations and to general course, that there is a tendency in many, to attain ultimately a more or less stationary condition with, apart from the periodic variation of certain symptoms, neither/

neither spontaneous improvement nor further progress downhill. This characteristic may be claimed of fourteen of the selected cases and was remarked by the writer, in two; Cockerham (17), Bauch (2), Tylecote (110), Burke (10), Munro (76), and Orsagh (80), describe a similar indolence in the later course of pulmonary syphilis.

RESPONSE TO TREATMENT.

Although it may be assumed, from the considerable duration of the great majority of the present cases, that general and non-specific treatment had been applied without success, it is of more value to consider only those cases of which adequate details are available.

Among the writer's cases, four had been treated, prior to diagnosis and anti-specific treatment, by expectorants, full diet with vitamin adjuvants, rest, and fresh air. In one case a stock vaccine had been used and in one, ultra-violet irradiation employed; one case was treated in the open air on strict sanatorium lines. Excepting this last, in which marked improvement in appetite, digestion, sleep, and weight ensued, there was no benefit whatever accruing to the continued prosecution of general tonic treatment and non-specific medication. Of the selected cases, eight had/

had spent in tuberculosis sanatoria periods of from three to ten months; in three cases there was considerable improvement in weight and strength, but unchanging persistence of pulmonary symptoms and signs; four cases benefited neither in general nor in local condition, while one lost ground so steadily that a diagnosis of malignancy was confidently made. Blakeman (5) states that pulmonary syphilis fails to react to a sanatorium regime while Landis and Lewis (64) report several cases which were treated in sanatoria for periods of six months and upward and which either showed no resultant improvement, short-lived improvement, or improvement in general condition only.

In marked contrast to the failure of general measures, the response to anti-specific treatment was generally immediate and rapidly progressive. In the cases reported by Landis and Lewis as having failed to benefit materially from sanatorium treatment, complete cure with disappearance of all pulmonary symptoms and signs followed rapidly upon the institution of anti-syphilitic treatment. Wile and Marshall (121) report in like terms, and Gibbes (38) cites, with other cases, the instance of a hospital patient with supposed tuberculosis who proceeded to miraculous cure after receiving mercury inunction intended for a known syphilitic occupying an adjoining bed; Bickle (4) recollects/

recollects great benefit in cases of apparent phthisis which were given a trial course of iodide of potassium; Downing (24) refers to cases which, for longer or shorter periods, had been treated as pulmonary tuberculosis and which had ultimately been given anti-syphilitic treatment with happy results, while Wilson Fox (35), quoting Lancereaux, cites several cases of cessation of phthisical symptoms after a course of mercury. Douglas (23) states that cure or arrest results very rapidly in all cases, and Cockerham (17), Weber (115), Stanley (100), Post (86), Easton (25), Robertson and Robertson (91) and Hoffmann (55), show correspondingly satisfactory results. Lissner (66) states "the excellent and dramatic descriptions by " "Fournier, of cases in which the cures can only be " "described as spectacular, are convincing." In Wood's series no attempt was made to enforce a sanatorium regime; the patients were allowed to work, did not even sleep out of doors, and received only simple tonics and oral anti-specific medication - "that " "they made definite improvement was certain and that " "retrogression commenced when they stopped treatment " "equally certain; improvement was not only general - " "shortness of breath diminished, dyspnoeic attacks " "ceased, respiration became stronger and deeper, rales" "disappeared, and finally the amount of dulness lessened" (124).

With/

With the institution of anti-specific treatment, the improvement of the present cases was so universally prompt and continuous that it is not desirable unduly to lengthen an already unwieldy paper by a full analysis. Necessity is served by quoting only those where most detail is available, and the rule proved by referring to exceptions. In two of the writer's cases treatment, in the first instance, was by iodide only; by the end of the first week improvement was apparent and, in respect of pyrexia and dyspnoea, was marked, while pain and haemoptysis had entirely ceased. Thereafter treatment was reinforced by moderate doses of the intravenous arsenicals; in three cases iodides and arsenicals were commenced simultaneously. Following the use of arsenic the response in all cases can only be described as dramatic. Dyspnoea ceased and temperature fell to normal within a few days, sweats and haemoptysis in one case ceased abruptly while in four cases there was rapid increase in weight and strength. The severity of cough was mitigated at once but it was noted, in three cases, that sputum was at first increased, becoming definitely muco-purulent in two; thereafter expectoration steadily diminished. By the end of two weeks all symptoms, with the exception of cough and some sputum, had gone; these continued for some time but after five weeks had also disappeared. Improvement in the ordinary clinical and radiological signs/

signs was equally prompt. A change for the better was noted on physical examination in one case as early as the third day, and on the ninth day in the case longest delayed. The first changes noted were diminution in moist sounds and, in two cases, marked decrease in the intensity of the bronchial breath sounds. Commencing in the second week in three cases, there was marked and progressive improvement in resonance; there was little or no alteration in the dulness in two cases. All five cases were examined radiologically between one and two months after the institution of anti-specific treatment; in two which had shown definite consolidative opacities these had disappeared in one, and had almost disappeared in the other; in three cases where the principal change had been hilar and peribronchial fibrosis, this had lightened in two, and was unaltered in one. Two cases were further examined after intervals respectively of ten weeks and four months; in one of these there was then no trace of the nodular opacities formerly present and in the other there was still no alteration in the extent and density of the hilar and peribronchial fibrosis.

Among the selected cases, retrogression on appropriate treatment appears to have been entirely comparable to that of the cases observed, and in some was seemingly even more spectacular; dyspnoea, haemoptysis, pain, fever, etc. ceased, if not abruptly, then rapidly/

rapidly, with progressive clearing of signs of moisture and consolidation, and disappearance of the extensive confluent or nodular opacities which had been noted on previous examination. There were, however, two cases wherein radiological examination had revealed the presence of single, isolated, dense opacities; resolution, as gauged by further x-ray examination, was a slow process - in one case the dense shadow had not disappeared after four and one half months, and in the other, was still present after eight months. These cases were again examined after one and four years respectively when it was found in both that, while the former heavy deposits had vanished, their situation was marked by the presence of a moderately dense stellate shadow thrown, presumably, by a firm scar.

The possible precipitation of pulmonary syphilis by the institution of treatment of the systemic infection has been referred to. No particularly unwelcome reaction followed the commencement of treatment in any of the present cases; the temporary increase of sputum in three of the writer's cases was a minor feature, and accompanied improvement, in all other respects marked. In one case, however, a considerable increase in the quantity of a pleural effusion occurred after the first injection of arsenic; subsequent progress and spontaneous absorption of the fluid were rapid/

rapid and uneventful. Although the series is barren in this particular, undesirable reactions may occur - Weber (116) quotes a case in which a secondary fever followed the initial fall in temperature; a more serious sequel is instanced by Gibbes (38), in a case which developed an abscess of the lung after the commencement of treatment, and a reaction still more serious, reported by Gibbon (39), appears to have been a genuine Jarisch-Horxheimer effect - after an initial improvement in the first week there was a sudden re-accession of fever with cyanosis, lung signs, and ultimately, a typhoid state and death.

EXTENT OF RECOVERY:

Hartung and Friedman (52) state that the absorption of the syphilitic lesions leaves behind a legacy of connective tissue and massive scars with, later, thickened pleura and contraction of septa leading to secondary compression, collapse, and bronchiectasis. While it is apparent from the literature that these latter sequelae are not infrequently the permanent accompaniments of many cases of lung disease in syphilitic subjects, it is far from established that they are directly associated with the constitutional disease. The present cases show clearly and to the contrary that, in cases where the lung disease fails to respond to measures other than anti-syphilitic, such/

such residual lesions are, except in very minor degree, unknown.

Some indication of the promptitude of recovery has already been given; when the general long duration and chronic course of the cases are borne in mind, not only the rapidity, but the completeness of recovery, become all the more striking. In forty cases all symptoms, both pulmonary and general, disappeared entirely; six cases were left with some morning cough, accompanied by sputum in five, and by dyspnoea on exertion in one. All signs of pulmonary disease cleared in thirty-two cases; among the remaining cases the residual signs were dulness in nine, moist sounds in five, harsh breath sounds in four, faint breath sounds in two, bronchial breath sounds in two, and slight limitation of expansion in two. Radiological examination after treatment showed a completely clear field in thirteen cases, peribronchial fibrosis only in three, hilar and peribronchial fibrosis with bronchiectasis in four, similar fibrosis, bronchiectasis and an isolated scar in one, fibrosis and pleural thickening in one, pleural thickening only in one, and an isolated scar in one. The five cases which thus showed persistent bronchiectasis were those with continuing cough, sputum, and moist sounds. In two cases treated by bismuth which had had, at previous examination/

examination, no evidence of calcification, slight deposition of lime salts had become apparent, and was probably facilitated by the use of this metal in treatment.

RELAPSE.

After apparent cure of pulmonary syphilis, recurrence of symptoms and signs appears to be not uncommon. In the series, relapse occurred in seven cases after an interval of freedom from all signs and symptoms of - three months in one case, six months in four cases, two years in one, and seven years in one. With the exception of the two latter, treatment had not been continued after the cessation of symptoms, the rapidity and completeness of recovery having accounted for early default. In the last-mentioned case, treatment had been continued for three years and, the Wassermann reaction having become negative, then terminated. In the remaining case, detail is lacking but treatment had certainly ceased. In all these cases the recrudescence of disease produced a clinical picture closely similar to that formerly present, while prompt and apparently complete recovery again followed the institution of anti-specific treatment.

The main points emerging from the foregoing sections may be summarized in the following conclusions

---- The course of pulmonary syphilis is characteristically one of long duration and is limited only by accurate diagnosis and appropriate treatment; there is evidence neither of spontaneous recovery nor of early fatal termination; in cases of acute onset the initial early progress soon lapses into chronicity; in approximately one third of the cases, both of acute and of insidious onset, there is a definite tendency to remain stationary for long periods; a true relapsing course is rare; acute exacerbation occurs in some 25% of cases and usually late in the course of the disease; in symptoms and signs it bears a striking resemblance to the acute pneumonic onset, and is of similar frequency.

---- General and non-specific treatment exerts no beneficial influence on the pulmonary symptoms and signs, but strict sanatorium regime may effect considerable improvement in general condition; the response to anti-syphilitic treatment is immediate, progressive, may be spectacular, and is noted in general condition, pulmonary symptoms, local signs, and radiographic appearances.

---- Recovery is usually complete; persistent slight cough/

cough, sputum and moist rales occur where bronchiectasis is present; otherwise residual symptoms are non-existent and residual signs negligible; massive and nodular inflammatory opacities disappear leaving no trace; gummatous opacities disappear slowly and are replaced by scar tissue; peribronchial fibrosis, bronchiectasis, and thickened pleura, are unaffected by treatment; calcification in healed lesions is rare but may follow the use of bismuth.

---- Immediately following treatment there may be slight temporary increase in certain clinical manifestations; serious and even fatal Jarisch-Herxheimer effects have occurred but are very rare.

---- Relapse is prone to occur where treatment is not continued and may occur even after considerable treatment has rendered the serum reaction negative; it is usually not long delayed but may be very late; it responds well to further anti-specific measures.

SUMMARY.

Forty-six cases of tertiary syphilitic disease of the lung are analysed from the clinical view-point: the clinical features of the individual cases have been separated piecemeal, grouped together, examined, and, where possible, have been correlated with pathological/

pathological fact. If the method has successfully elucidated the clinical characteristics of a little known condition, the purpose of this thesis has been achieved, and, with the hope that springs eternal, it is now concluded.

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