

period of the experiment. Results obtained with cooked potato (it is not possible to feed guinea-pigs on raw potatoes), fresh orange juice, fresh grapes, and fresh raw cabbage leaves, are added for purposes of comparison.

*Comparative Antiscorbutic Value of Various Raw Vegetable Juices.*

The juice of the fresh raw swede easily takes the first place in respect of antiscorbutic value. Protection from scurvy was attained with a daily ration of 2.5 c.cm. In case of raw carrot juice, severe scurvy developed in animals receiving daily rations of 5 c.cm. and 10 c.cm.; with a daily ration of 20 c.cm., protection from scurvy was secured and the general condition of the animals was about the same as of those receiving a daily ration of 2.5 c.cm. swede juice. In case of beetroot, the antiscorbutic value was less than that of carrot; animals receiving a daily ration of 20 c.cm. fresh raw juice showed only a small degree of protection, acute symptoms of scurvy supervened in every case, and death from scurvy occurred in several instances before the period of experiment, three months, had expired.

It is thus seen that raw swede juice provides a valuable and inexpensive source of antiscorbutic material. Its value is not markedly inferior to that of fresh orange juice, and it may be regarded as a satisfactory substitute; its value is 10 times that of raw carrot, and more than 10 times that of raw beetroot juice. It has recently been adopted in some infant welfare centres, and there does not appear to be any drawback to its use for the purpose of infant feeding.

Raw carrot has long been popular as an adjunct to the dietary of infants and there is traditional support for its worth. So keen an observer of his own day as Anthony Trollope, in "Barchester Towers," 1857, depicts the older generation in the person of Miss Thorne strongly advising the young mother to smear raw carrot juice and allow it to dry upon the baby's coral, in order to ensure for the infant a healthy set of permanent teeth in the future. "The receipt had been much in vogue in the young days of her (Miss Thorne's) grandmother," who "had the best teeth in the county and carried them to the grave with her at eighty." (Bohn's Library Ed., Bell and Sons, 1913, p. 234.)

It is interesting to observe the root vegetables investigated are widely separated in the vegetable kingdom; the swede belongs to the natural order *Cruciferae*, the carrot to the *Umbelliferae*, the beetroot to the *Chenopodiaceae*, and the potato to the *Solanaceae*. It is significant that the natural order *Cruciferae* should also include the cabbage, most potently antiscorbutic of the vegetables investigated in the present inquiry, and the "scurvy grass" (*Cochlearia officinalis*) and the "cresses," so justly esteemed by the sailors suffering from scurvy in the old days.

Bachstrom (Observationes circa Scorbutum, 1734) relates the following remarkable story: "A sailor in the Greenland ships was so over-run and disabled with the scurvy, that his companions put him into a boat, and sent him on shore; leaving him there to perish, without the least expectation of a recovery. The poor wretch had quite lost the use of his limbs; he could only crawl about on the ground. This he found covered with a plant, which he, continually grazing, like a beast of the field, plucked up with his teeth. In a short time he was by this means perfectly recovered; and, upon his returning home, it was found to be the herb of scurvygrass." (Rendering given by Lind, 1757. A Treatise on the Scurvy, 2nd edit.) It is interesting to find that the old legend that the cruciform arrangement of the flower was an indication of especial virtues in the service of man thus receives scientific support at this comparatively late date.

*Summary.*

1. Cow's milk possesses distinct antiscurvy properties, but these are present in small degree in comparison with other antiscorbutic foodstuffs. Its value in this respect is further reduced after heating or drying. It is therefore advisable to provide some extra antiscorbutic material in the diet of infants nourished upon heated or dried cow's milk.

2. The antiscorbutic value of various materials that might suitably be included in an infant's diet has been experimentally determined by means of experiments with guinea-pigs. Among fresh fruit juices that of the orange is easily the most suitable, and possesses a value about ten times as great as that of fresh grapes. Of the raw vegetable juices examined, raw swede juice proved to be far the most potent, approximating in value to raw orange juice; the raw juice

of carrots was found to be much inferior, and that of beet-roots failed to prevent scurvy in the largest dose (20 c.cm. daily) that could be administered to the experimental animals.

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## HÆMORRHAGIC BRONCHITIS:

CASTELLANI'S BRONCHO-PULMONARY SPIROCHÆTOSIS.

BY H. VIOLLE.

(From the Institut Pasteur, Paris.)

IN view of the fact that cases of broncho-spirochætosis (Castellani's bronchitis) have recently been observed in Europe—I have first found the disease in France, having recorded a large number of cases of it in Toulon—a few notes on the subject will perhaps be found to be of some practical interest.

This affection and its etiological agent were first described by Castellani in Ceylon in 1905.<sup>1</sup> He called the malady broncho-spirochætosis and the germ *Spirochaeta bronchialis*. Castellani's observations were confirmed in various parts of the tropics, by Branch in the West Indies in 1907, by Jackson in the Philippine Islands in 1908, by Waters in 1908, who recorded a number of cases in India, by Phalen, Kilborne and Chamberlain, Taylor, Chalmers and O'Farrell, Harper, and others in various other tropical countries.

In Europe a few cases were observed in 1915 by Galli Valerio in Switzerland, one case by Lurie in Serbia, and a few by Castellani himself in the Balearic-Adriatic zone. Very little attention, however, was paid in Europe to the disease until it was found in France by myself in 1916. At Toulon, where I have been carrying out the investigation, a comparatively large number of cases has occurred among the native troops coming from the Far East, as well as in Europeans who had never been to the colonies. A special ward in the St. Mandrier Hospital had to be set aside for cases of this disease, and I was placed in charge of it.

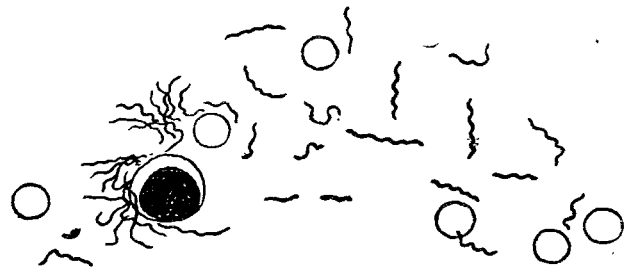
*Symptomatology.—Mode of Infection.*

The symptomatology I have observed in my patients is the following:—

The patient has generally been sent to hospital with the diagnosis of tuberculosis or suspected tuberculosis, and one can easily understand why this diagnosis has been suggested, as in very numerous cases the patient is spitting up blood. The bloody expectoration is often of a peculiar vividly pink colour, somewhat different from what one usually sees in hæmoptysis of tubercular origin.

The cough is frequent, sometimes more severe during the night. The physical examination of the chest in some cases reveals very little or nothing; in other cases there are signs of simple bronchitis with or no emphysema; in others there are signs of consolidation.

The general condition of the patient is often fairly good, even very good, and very often there is no fever.



The blood at times shows a slight degree of anæmia, due to the repeated attacks of hæmoptysis. The number of leucocytes is normal, and so is generally the leucocytic formula. (See figure.)

The microscopic examination of the sputum reveals presence of *S. bronchialis* in enormous numbers; the preparations are teeming with it.

<sup>1</sup> THE LANCET, 1906, i., 1384.

To put in evidence these spirochætes one may use the ultra-microscopic for fresh preparations, or one may stain with Romanowsky and similar methods. The best method is the silver nitrate one of Fontana-Tribondeau.

The *S. bronchialis* Castellani is an organism extremely variable in length, shape, and number of spirals; length 4 to 30 microns, mostly 7-14. According to Fantham these medium forms are derived from the long ones by transverse division.

Certain individual spirochætes have very few spirals, two or three, others have a large number with spirals very close; numerous intermediate types can be found. The spirochæte has been carefully investigated from a morphological standpoint by Fantham. It has not yet been cultivated. I have not been able to reproduce the disease in rabbits, guinea-pigs, and pigeons, but Chalmers and O'Farrell have reproduced the disease in a monkey by intratracheal injection.

The disease, according to certain authorities, is very contagious, the contagion taking place, according to Fantham, from infected persons to healthy individuals by means of the so-called "coccoid bodies" derived from the spirochætes. Without denying this mode of contagion, I am inclined to believe that *S. bronchialis* may be present in very small numbers in many individuals, similar to what is the case, for instance, with the pneumococcus, and that any cause lowering the vitality of the tissues, such as a chill, may cause *S. bronchialis* to multiply and to invade the whole of the broncho-pulmonary system.

As regards the possibility of spirochætic infections spreading from the mouth to the bronchi, I must say that, except in one single case, none of my patients had any mouth lesions of spirochætic origin, and their teeth and gums were in good condition.

#### *Diagnosis and Treatment.*

*Diagnosis.*—This is based on finding *S. bronchialis* in large numbers in the expectoration, while there is absence of the tubercle bacillus, of hyphomycetes, and of ova of *Paragonimus westermanii*, Kerbert, which at times may give rise to bloody expectoration. Clinically, if a patient presents bloody expectoration of a vivid pink colour and is in good health, the practitioner should be on the look-out for Castellani's broncho-spirochætosis. Cases of mixed infection of broncho-spirochætosis and tuberculosis occasionally occur; similarly, cases of bronchial spirochætosis plus bronchomoniliasis have been recorded.

*Prognosis.*—The prognosis, as a rule, is favourable; in many cases all the symptoms disappear within three to four weeks from onset. Relapses, however, seem to be frequent, and chronic forms occur with expectoration, which is at times muco-purulent, greenish, and at times mixed with blood.

*Treatment.*—In a large number of cases active therapeutic measures are not called for, rest, nourishing diet, and country air being sufficient to bring about a cure. Ergotine and tr. iod., a few drops well diluted, should be given if the attacks of hæmoptysis are severe, and if there is not much secretion and the cough is very painful opium preparations may be administered.

As regards specific treatment arsenic and tartar emetic have been used by Castellani and others, while certain authorities recommend arsenobenzol. Satisfactory results from such a line of treatment will at times be obtained in chronic cases.

In conclusion, it seems to me that attention should be more generally paid to the presence of broncho-spirochætosis in European countries. My researches have shown, for instance, that this malady is met with in France.

In cases of patients spitting up blood a correct diagnosis is of extreme importance; it will relieve the patient's feelings to know that he is not suffering from the dreaded tuberculosis of the lungs, but from a disease which is much less serious and generally terminates in recovery. A correct diagnosis is important also from a medico-legal point of view, because tuberculosis entails permanent discharge from the Army with a pension, while bronchial spirochætosis merely means in most cases giving the patient a few weeks' rest, after which he will be able to resume his military duties.

At the instance of the National Council of Trained Nurses, Mrs. Bedford Fenwick will stand for election to Parliament on the National Health ticket when a suitable constituency can be found.

## LOCAL ANÆSTHESIA AND TWILIGHT SLEEP IN THE SURGERY OF EXOPHTHALMIC GOITRE.

BY S. H. ROUQUETTE, M.Ch. Camb., F.R.C.S. Eng.,  
RESIDENT ASSISTANT SURGEON, ST. THOMAS'S HOSPITAL.

DURING recent years an ever-increasing number of the subjects of Graves's disease have been submitted to operation with a measure of success which would have seemed scarcely credible in days gone by before the factors of safety were as well understood as they are now. That surgery can produce an immediate cure in some cases and marked improvement in others there can be no doubt, but time alone can show whether the cure is permanent.

#### *Limitations of General Anæsthesia.*

It is generally recognised that the only surgical measure likely to prove of permanent value consists in ablation of the greater part of the gland, the exact amount depending on the age of the patient, the severity of the disease, and on various other factors. As the determination of this amount is exceedingly difficult there are many cases in which a second operation is required still further to reduce the size of the gland, but with the growth of experience secondary operations are likely to become less frequent in the future.

The very great diminution in the mortality of the operation is due partly to a better appreciation of the time at which operation should be undertaken, but far more to a realisation of the danger of anæsthetics, culminating in the absolute prohibition of chloroform. Ether is still used, and in highly skilled hands is a safe anæsthetic for very slight or early cases, as well as for those which, though originally severe, have been markedly improved by a previous operation; but I am inclined to think it is not sufficiently safe for a primary operation in a severe case.

Of the various methods of administration the rectal is achieving popularity, and has found a warm advocate in Mr. A. J. Walton and others who speak with authority. I have not made an extensive trial of this method, but such experience as I have had has only served to strengthen my preference for local anæsthesia. On several occasions Dr. Z. Mennell has given ether for me by the intratracheal method with great success, but while I regard this as the most suitable for large, simple goitres with respiratory embarrassment, it is limited by the conditions formulated above.

#### *Local Anæsthesia.*

Foremost among pioneers in this branch of surgery, Dr. T. P. Dunhill, of Melbourne, will ever be remembered as the champion of local anæsthesia; readers of THE LANCET are familiar with his teaching and aware of the results he has obtained. No one who read his paper of Dec. 15th, 1917, can fail to have been impressed by the extraordinary recovery of the most desperate cases under his care, cases which could only have terminated fatally in a very short time but for his intervention. Dr. Dunhill himself attributes his successes to the use of local anæsthesia, and, indeed, if one may judge from the photographs in his paper, it would seem doubtful whether any anæsthetist could have been found willing to deal with patients in so grave a condition.

Surgeons in this country have tried local anæsthesia, but do not seem addicted to its use. It certainly possesses two disadvantages: in the first place, the mind suffers what the body does not feel; and, in the second, the personality of the patient is apt to intrude and embarrass the surgeon, with the result that the operation may degenerate into a trying ordeal for both. In such circumstances the surgeon is hindered in his work and may be unable to remove an adequate proportion of the gland. Local anæsthesia cannot abolish the pain arising from certain of the manipulations; but while some patients bravely resign themselves and tolerate discomfort without flinching, others are physically incapable of exercising the necessary self-control. When it is remembered that the patients are sufferers from Graves's disease, it will be realised that local anæsthesia must often leave much to be desired.

It was with a view to improving the technique and alleviating the distress of the patient during the operation that I began to use preliminary injections of morphine and later of hyoscine as well. I found that the operation could