the vital powers in the case of a phthisical subject presenting himself in the consulting room, 20 beats can, on an average, be subtracted from the pulse-rate observed during the examination, and even more in the case of persons who are unusually excitable, though, needless to say, this cannot be made an obsolete rule. If, on making this allowance, the pulse-rate exceeds 100, the case is not likely to exhibit an approach to recovery in the time mentioned above, and is therefore not suitable for admission. Also in the case of patients under more direct observation, if, after a period of complete rest in bed, the pulse continues to run at or exceed 100, the outlook is not promising. However, as mitral stenosis is at times a factor in the causation of the disease, a pulse-rate exceeding 100 in such a case is not of such grave import so far as the tuberculous process is concerned, as an unusual rapidity will be found even in the earliest stage. In attaching a significance, therefore, to the pulse-record in cases of pulmonary tuberculosis, allowance must be made for the possibility of over-exertion, excitability under examination, and the presence of mitral stenosis; but, with these reservations, some assistance will be obtained in making a pronouncement regarding the probable duration of life. Cases, again, in which a tuberculous area in the lung has been cleared out by excavation, followed by a period of quiescence during which the cardiac pulsations may not exceed 84 per minute, are suitable for treatment, as there is a likelihood that life will be prolonged considerably by six months' residence in a sanatorium; so that a consideration of the pulse-rate may point to a more hopeful outlook than would at first sight be suggested by somewhat advanced physical signs. A pulse of 100 or more will usually be found to accompany an evening temperature reaching or exceeding 101°, and these two signs of grave import being persistently present in a case in which absolute rest has been enforced for some time, give little hope of treatment proving of any avail. A temporary condition such as that just described will be found in an acute onset of the disease, which is so frequent that numbers of patients date the commencement of their illness from an attack which has been designated "influenza" by their medical attendant. With confinement to bed and appropriate treatment the acute symptoms usually subside, and the case, if recognised thereafter within a reasonable time, falls into the category of those likely to prove amenable to treatment, with a pulse-rate of under 100. As acceleration of the pulse is found at the onset of the pulmonary affection, so a gradual fall will be found to take place if a case is making progress towards recovery. On inspecting the records of a number of cases in which recovery, or an approach to it, was obtained, this fact is demonstrated. Taking the register during the first week of residence when strict rest has been enjoined, and comparing it with the record of the last week when walking exercise extending to several miles has been allowed daily, a decrease in the pulse-rate has been found in the latter case, varying from a few beats to 16 a minute, the diminution being naturally least in the cases in which there was the slightest deviation from the normal in the first instance.

The details of two cases are appended:

Case.	Week of Residence.	Average Pulse-rate.
A. W.	1	96 per minute.
	5	92 "
	9	88 "
	13	84 "
	17	83 "
	27	80 "
Mrs. H.	1	92 "
	5	84 "
	9	77 "
	*12 to 14	106 "
	18 to 26	77 "

* During a temporary exacerbation of temperature.

PRESENTATION.—Dr. J. G. McNaughton has, on the occasion of his leaving Turriff, been presented by his patients and friends with an illuminated address and autograph album, together with a substantial purse of sovereigns.

THE POSITION IN WHICH THE REGURGITANT AORTIC MURMUR IS MOST CLEARLY AUDIBLE AT THE BASE OF THE HEART.

By H. W. SYERS, M.A., M.D. CANTAB.,
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Not long ago I read a paper in which special attention was drawn to the fact that in a case of aortic valve disease the regurgitant murmur was audible most loudly at the second left interspace close to the sternum. It was evidently considered that this was quite contrary to rule—at all events to textbook rule—and was worthy of special comment. I have repeatedly noticed in practice that the same weight is attached to the necessity of the aortic reflux murmur being loudest at the second right interspace. Indeed, such is the tenacity with which this view is held that it seems worth while to call attention to the fact that at least 95 per cent. of the cases in which aortic reflux occurs the diastolic murmur is heard much more loudly at the second left interspace close to the sternum than in the position usually assigned to it—namely, the second right interspace. This is a remarkable circumstance, and undoubtedly accounts for the fact that aortic reflux murmurs are constantly overlooked.

For my experience tells me that there is no heart murmur which more often eludes detection than this one; a murmur, too, which alone stands pre-eminently as the only one indication of undoubted valve lesion. Of course, the ordinary loud sound of a double aortic murmur is audible without the least difficulty, and to this my remarks do not apply. I limit them to that low-pitched, soft, aortic murmur which often accompanies but does not replace the second sound, and which is of evil significance.

Now, I do not say that the second left interspace close to the sternum is the locality in which the aortic reflux murmur is most loudly heard, but only that it is much more distinct there than in the position ordinarily assigned to it. The point at which the murmur is loudest is almost invariably the middle of the sternum, and it is frequently very loudly audible just above the xiphoid cartilage.

How has the mistake arisen? From the statements in the textbooks being accepted without enquiry, in a slavish tendency to copy erroneous teaching, in an indolent indifference; and, lastly, in the growing tendency to employ the binaural instrument. This last is, I believe, one of the most serious dangers that has ever threatened the practice of auscultation, and will, I am persuaded, if persisted in, lead very rapidly to the decline and fall of diagnosis of chest disease.

So little is it recognised that the murmur of aortic reflux is most obvious over the pulmonary area that the textbooks make no sign as to the futility of seeking the maximum intensity of the murmur in the position assigned by them, and, as I have already mentioned, the fact of the murmur being loudest over the second left interspace has been recorded as something out of the common and exceptional.

And yet as I write it is necessary to add that only so recently as yesterday I examined a case in which the reflux murmur was found to be more loudly audible over the right than the left second interspace.

This is just one of those cases that will fall into the remaining 5 per cent. of the total number, the occurrence of which is so exceptional as to prove the rule.

The matter is of more than merely theoretical importance. Everyone knows that some varieties of the aortic regurgitant murmur are most difficult to hear, being extremely soft and low in tone. Now, it stands to reason that in such cases the observer must listen at that spot where the murmur is most loudly audible, or he will be in great danger of entirely overlooking the adventitious sound.

My experience of aortic regurgitant disease is that, except in its unmistakable form, it is the most likely to be overlooked of all valvular lesions, and this especially in the case of those soft murmurs the prognosis of which is the worst possible, and in which it is therefore most necessary that a correct diagnosis be made. Over and over again have I been told that the second sound is clear at the second right interspace; but careful auscultation at the second left interspace

has easily informed me that a soft murmur accompanied and followed the clear second sound. It is extraordinary how constantly it is forgotten in practice that the second is a double sound, that it contains a pulmonary as well as an aortic element. To this fact and to the propagation of errors by means of textbooks, as well as to the causes already indicated, I attribute the mistake.

THE DEVELOPMENT OF FILARIA NOCTURNA IN DIFFERENT SPECIES OF MOSQUITOS.

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The two common species of *Culex* found in St. Lucia are a brown insect very closely resembling *Culex pipiens*, which Theobald, in specimens sent home to England by Dr. Grey, of Castries, has identified as *Culex fatigans*, and a smaller, brownish-black insect with white-banded legs, the common *Culex teniatus*. The latter is very bloodthirsty, feeding by night or day, whereas the former, which is also less plentiful, only feeds by night. Both these species were fed on a patient with numerous filaria nocturna embryos in his blood, to ascertain to what extent they might act as efficient hosts for the spread of filarial disease.

The results as regards *Culex fatigans* are of special interest, because they tend to confirm the original observations of Manson in Amoy as to the time taken for the final metamorphosis of the embryonic forms of filaria nocturna in the body of the mosquito.

Technique.

Larvæ collected from waterbutts, tubs, and similar situations were placed in teacups in small wooden boxes, $1\frac{1}{2}$ ft. long, by 1 ft. broad, and 1 ft. high, each of the sides being covered with gauze to admit air. At one end a door closed by a sleeve of gauze was constructed, large enough for the hand and arm to be easily passed into the house. In a few days many of the larvæ became transformed into insects. In the evenings about 9 P.M. the patient simply placed his hand and arm in the box, and all the mosquitos which bit him were then caught in ordinary test tubes and transferred to a separate box, where they were kept till required for dissection. No trouble was experienced in keeping the insects alive. They were fed on bananas and brown sugar. A certain proportion of males were kept with the infected females, and many of the latter deposited their eggs in small glass vessels full of water kept for the purpose in the boxes. This method of infecting mosquitos is simpler than introducing them under the mosquito net of a patient's bed at night. None are lost, and the trouble of collecting and separating them is reduced to a minimum.

Experiments on *Culex teniatus*.

On dissecting insects of this species twelve to twenty hours after feeding, many actively-moving filaria embryos are seen in the muscles of the thorax; they have then no trace of the long sheath which encloses them while circulating in the human blood.

Four and a-half days after infection the embryos show some development; they are now longer and broader, and show with a high power some increase in the number of the cells of the body. A fine cuticle, ending in a sharp point some distance behind the tail, encloses them.

At seven and three-quarter days they have become distinctly sausage-shaped; the mouth is now visible, and the body cells are becoming arranged to form the alimentary canal. Many show the usual hernial protrusion at the anus; all still have the fine cuticle.

At dates later than this (eight and three-quarter days) some have changed from the sausage stage, becoming now elongated, and there is further increase in the cellular structure. Later than this, from nine days onwards, though occasionally seeing a more developed form with a fairly distinct alimentary canal, the growth of the embryos seems to come to a standstill. Instead of rapidly increasing as inefficient hosts they begin to degenerate, the cells of the body becoming granular, and the intestinal canal very indistinct.

At fourteen days nearly all have disappeared, only small imperfectly-developed ones remaining. Some of these are still alive, and move feebly.

At seventeen days only about one out of ten insects shows anything, and the embryos seen are either dead or degenerating. At twenty days after infection no trace was to be seen of filariæ in many mosquitos dissected.

The conclusions, therefore, one must arrive at as regards *Culex teniatus* are that this insect is not an efficient host, a fact already hinted at by Dr. Rees¹ at the last meeting of the British Medical Association. Though the embryos migrate to the thorax and undergo some development, yet none ever reach maturity, and therefore never pass to the proboscis, a very fortunate circumstance for St. Lucia and other places which harbour this troublesome pest.

Experiments on *Culex fatigans*.

In marked contrast to the slow and imperfect development of the embryo in *Culex teniatus* is the extremely rapid rate of growth they exhibit in the thoracic muscles of *Culex fatigans*. In twelve to twenty hours after feeding large numbers have arrived in the muscles, and even in forty hours show a considerable amount of change. There is increase in the number of the cells, and the fine cuticle can be seen tapering to a point posteriorly.

By the end of four and a-half days the sausage stage has been reached, the alimentary canal has begun to form, and the mouth and anus are visible. They are now larger and stouter than the stage described in *C. teniatus* at seven and three-quarter days. Growth now goes on with great rapidity.

At five and a-half days they have lengthened out, the anatomical structures being better marked.

At six and a-half days they are still longer; mouth, anus, and alimentary canal are very distinct and well formed, and on the following day the cesophageal bulb has appeared; most have lost the fine cuticle, and some show the commencement of the trilobed tail.

At eight and a-half days they measure 0.88 mm. in length by 0.04 mm. in breadth; the large cells which originally formed the intestinal tube having at this date become transformed into fine small cells, and the whole appearance very much resembles that seen in the final stage of development. The next two days are taken up with a further increase in length.

At ten days and a-half forms measuring 1.26 mm. ($\frac{1}{8}$ in.), to 1.3 mm. in length by 0.04 mm. in breadth, are seen. Anatomically they present a mouth, an cesophagus, an cesophageal bulb, and a long alimentary canal ending at the anus, which is situated some little distance above the trilobed tail.

Movement is now very active; though they do not change their positions on the slide they are constantly twisting and coiling themselves about in what has been called a purposeless manner, very much resembling the movements of the immature embryos when seen in a drop of blood.

By the following day (eleven and a-half days) metamorphosis is complete, and mature forms are seen in the head and neck, and proboscis, and more rarely in the abdominal cavity. One is at once struck by the fact that the embryos vary considerably in length, and also that the thoracic muscles still show a number of very short filariæ which have developed much more slowly; this corresponds to what was seen in sections of mosquitos made by myself in London from material sent home by Dr. Bancroft. Measurements give for the longest of the mature embryos 1.6 mm. ($\frac{1}{8}$ in.), while one dissected out of the proboscis only attained to 1.44 mm. ($\frac{1}{4}$ in.), and another in the muscle was as small as 1.26 mm. ($\frac{3}{8}$ in.). The breadth varies from 0.024 mm. to 0.032 mm.—that is, they are finer than those seen at ten and a-half days. None as large as $\frac{1}{2}$ in., the limit given by Bancroft, were seen. Whence, then, arises the great difference in the times given for complete metamorphosis by Manson in 1879 and 1883,² and more recently by Bancroft in Australia.³

James⁴ has already entered into this question. Working with *Anopheles Rossii*, he found that twelve to fourteen days are required for the complete development, and he puts forward the view that climate and probably other factors have an important influence on the development of the parasites.