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STROPHANTHUS: A CLINICAL STUDY.¹

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DURING the years in which I have made use of the tincture of strophanthus I have frequently noticed that failures to obtain clinical results have repeatedly occurred. This experience is similar to that of other practitioners if we may accept the reports to be true which are found in current medical literature. In addition I have observed the very large doses which have been given without appreciable effect; these doses were certainly improper, in view of the brilliant results which often follow the administration of small or even moderate ones. Some months ago, on reviewing the literature, I was very strongly impressed by the discordant reports of observers whose position and training entitle their published observations to be seriously considered. In view of these facts the conclusion seems to be unavoidable that the source of the pharmaceutical preparations must be various. Faulty methods in drug preparation can be excluded, for in my earlier studies care was exercised that reliable tinctures only should be employed. With the intention of clearing up some of the inconsistencies, to say nothing of the contradictions, I have undertaken this study from the standpoint of the clinician, hoping to establish for the tincture, from a particular drug source, a practical working basis. From what I can learn I have come to the opinion that the so-called *Strophanthus hispidus*, variety Kombé, of the Pharmacopœia is not a variety, but a distinct species. In the following observations I have made use of a 5 per cent. tincture, prepared according to the United States Pharmacopœia from strophanthus (Kombé). In order that I might eliminate errors of pharmaceutical manipulation I have employed the tincture of strophanthus (Kombé) made especially for me by Parke, Davis & Company. For the drug which I have used I claim nothing further than that it is made from selected material by an expert pharmaceutical chemist. I have chosen clinical observation because of the rather scanty literature based upon sphygmographic work. Upon this species (Kombé) alone it is my intention to report, reserving for another occasion the presentation of similar studies upon what I believe to be four absolutely independent species of strophanthus.

After considerable experience with both Marey's and Pond's sphyg-

¹ Read before the Medical Society of the State of New York, at Albany, January 27, 1897.

mograph I have finally settled upon the use of Dudgeon's instrument as the one most practicable for the practitioner, and this has been exclusively employed in making the tracings for this study. The least pressure consistent with the production of a characteristic tracing has been used, and tracings presenting any suspicion of undue weighting, as rounded apices, have been rejected and a second tracing made. It is only fair to state that many of the patients had been treated, some for many years, with digitalis and similar drugs, and that all presented lesions giving rise to symptoms of marked severity. My purpose has been not to demonstrate that this particular preparation is one to be administered as a routine prescription, but rather to ascertain the dosage, to find out the real effects of administration, and to point out the advantages of its use when employed in a judicious manner. Incidentally, as will appear later, it will be shown to possess certain advantages over other drugs in relieving positive, well-marked pathological conditions.

The physiological action of strophanthus has been thoroughly worked out by Fraser and Delsaux. Its field of action is especially upon cardiac muscular fibre, and this action is marked. Therefore we should expect an energetic cardiac systole, and secondarily a slower pulse-rate. As a consequence of a slower and more perfect systole, an irregularity of rhythm previously existing becomes lessened. There is but little change in the calibre of the bloodvessels. It possesses a diuretic action under limitations; that is to say, it is diuretic so far as increased blood-tension causes a larger amount of urine to be excreted.

Clinically its action has been reported upon by many observers, and with a great lack of uniformity as to their conclusions. To mention only those whose published records are readily accessible, I would cite Fraser, Paschkis and Zerner, Corville, Egasse, Porteous, Lemoine, Drasche, Fränkel, Purdy, Helbing, Bahadurje, Dana, Denian, Hammond, Gley, Quinlan, Aulde, Mays, Budd, Pins, Hochaus, Wadleigh, Evans, Robinson, Hutchinson, Ferguson, and Yount.

Its therapeutic field of usefulness can be ascertained from the following facts: (1) it acts directly upon cardiac muscle (Fraser, Yeo, Biddle, Potter); (2) it has little or no influence upon the calibre of the bloodvessels (Fraser, Delsaux, Yeo); (3) it acts but temporarily upon the innervation of the heart (Hayem), if at all; (4) it is diuretic (Fraser, Delsaux, Porteous) in certain cases (Yeo), particularly those in which the previously existing blood-pressure is low (Budd); (5) it is a bitter stomachic (White), and in moderate doses does not disturb digestion (Budd), and it relaxes the bowels (Porteous); (6) it is antipyretic (Potter, Rovighi, but denied by Martini) within limited range, because under its administration the consumption of oxygen is smaller and the processes of combustion are depressed (Bartholow); (7) since its active

principle is soluble in less than its own weight of water, it possesses the diffusibility of a soluble crystalloid (Fraser), hence the prompt results from its administration; its active principle escapes with the urine (Wood), so that we have also ready elimination (Butler), although somewhat slower than its absorption, and therefore an overlapping of effect from too frequently repeated doses (Bartholow); (8) habit does not seem to impair the therapeutic usefulness of the drug (Farquaharson).

The therapeutic indications are, then: (1) Rapidly recurring cardiac systoles of lessened force and irregular rhythm. We get then, first, a more vigorous contraction of the ventricle, with a slowing of the pulse-rate and consequently a lengthening of the diastole, which is the period of rest for the heart; next comes the disappearance of irregularity of rhythm; and lastly, from improved intracardiac nutrition, a permanent strengthening of the heart-muscle. (2) The absence of vasomotor effects enables us to use this remedy in those instances of permanent high tension which are met with in some forms of Bright's disease, in arteriosclerosis, and in the rigid arteries of the aged. (3) Whenever diuresis can be promoted by increased blood-tension resulting from more vigorous cardiac contractions this may be expected from the use of this remedy. (4) The rapidly appearing effects of its administration, together with its regular elimination, make it the drug of choice when the symptoms are urgent. (5) The absence of digestive disturbances from therapeutic doses and slight likelihood of habituation to its administration make it important when long-continued use is necessary.

The instances in which failure will follow its administration are those of (1) advanced degeneration of the myocardium (Fraser, Quinlan); (2) extreme mechanical obstruction to the circulation from valvular incompetency or obstruction; and (3) a combination of these. Balfour does not find the remedy useful in the aged. When we remember that arterial degenerations are extremely common in advanced life, I am of the opinion that Balfour is in error, at least so far as the use of moderate doses is concerned. It goes without saying that in fully compensated hearts this—as well as other drugs of the same type—is unnecessary, and when over-compensation exists it will likely aggravate the condition. I am thoroughly in accord with Hare in acknowledging its great value in the cardiac diseases of children. In addition, in corpulent individuals we obtain most excellent results. Of especial importance we should consider its administration for the weak hearts of anæmia and chlorosis, in order that nutrition may be improved; for the so-called irritable hearts, where the pain and palpitation are relieved; for the debilitated hearts, associated with dyspeptic symptoms and particularly flatulence, which usually disappears; and in the aged, where vertigo is the result of cerebral anæmia.

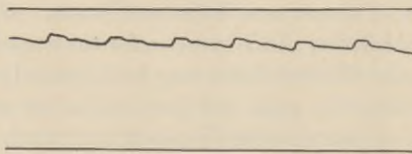
Sphygmographic tracings have been used to demonstrate the results

of the administration of this drug by but comparatively few observers, among whom may be cited Sée and Gley, Paschkis and Zerner (two cases), Denian (six cases), and Fraser (five cases).

In general, it may be stated that within an hour the pulse visibly strengthened, the line of ascension, from being nearly horizontal, approached the vertical, the line of descent suddenly fell, the dirotic wave disappeared, and the irregularities and inequalities were almost always overcome. Nor is this a temporary effect, as is shown by the permanence of the results upon continuation of the same or lessened dose, as may be seen in the following tracings made at intervals and extended over a considerable period of time.

CASE I.—Mrs. H., aged thirty-five years, married eight years, the mother of two children, came to me October 27, 1896, complaining of constant dyspnœa, severe pain in left chest, fainting upon several occasions, and distress after eating. She had had all of the infantile diseases, but no severe illness excepting severe polyarticular rheumatism ten years ago, from which she had practically recovered. For the past two years she had been failing in health, and in addition to the above symptoms she had complained of severe backache, bearing-down pains, vaginal discharge, irritability of the bladder, profuse and painful menstruation, for which she had been treated by a gynecologist of prominence for many months with but slight relief. On physical examination a rather obese woman with dusky skin and cyanotic lips presented herself. The apex-beat was in the sixth interspace, diffuse, and only located by the stethoscope in the mammillary line. At the apex was heard a soft, blowing murmur, coincident with the ventricular systole; at the second right costal cartilage were heard two murmurs: one harsh, with the ventricular systole, the other soft, replacing in part the aortic second sound, occurring with the ventricular diastole. The first cardiac sound as heard at the apex was of higher pitch, shortened, and distinctly weakened; the pulmonic second sound was accentuated. The liver was sensitive to the touch and distinctly below the free border of the ribs. At both bases of the lungs posteriorly there were a dull percussion-note and many crepitant râles. The urine was of a specific gravity of 1025, containing a trace of albumin, a few hyaline casts, and increased earthy phosphates. The abdomen was distended, tympanitic on percussion, and sensitive on palpation. The diagnosis of the cardiac condition was mitral insufficiency, aortic obstruction and insufficiency, with dilatation of the left ventricle. The pulse-tracing is as follows:

FIG. 1.



The tincture of strophanthus, hereafter in this paper simply termed "strophanthus," in dose of four drops dissolved in a wineglass of water, was directed to be taken after each meal.

November 3. The patient states that the dyspnoea has been markedly relieved during the past four days, and that the dyspeptic symptoms have improved.

One week later improvement in the symptoms referable to the genital organs was marked, although no local treatment had been carried out.

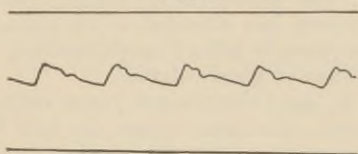
17th. She reports that for the first week in two years she has been free from chest-pain and that her appetite is excellent. The passive renal congestion had disappeared, and the liver was no longer sensitive.

24th. The abdominal symptoms were much benefited and dyspnoea appears only on ascending stairs.

December 1. As the patient was on her way to my office she became very much alarmed at a street accident, but was positive that the palpitation was much less than on former occasions with less cause.

12th. All symptoms were so much improved that the patient again had resumed her social duties.

FIG. 2.



22d. Owing to the fact that the patient has been busily engaged in going about town, she has not improved, but has at least retained her previous improvement.

29th. To-day the report is decidedly favorable, there having been less backache and no dyspeptic symptoms.

January 5, 1897. Owing to mistake, the patient has received ten drops of tincture of digitalis in place of the strophanthus. The old symptoms have returned, especially the dyspnoea. Four drops of strophanthus are now to be taken thrice daily.

12th. The patient is in excellent condition. The signs of ventricular dilatation have now disappeared, and the first sound is now loud. The pulmonic second sound is normal and compensation is now established.

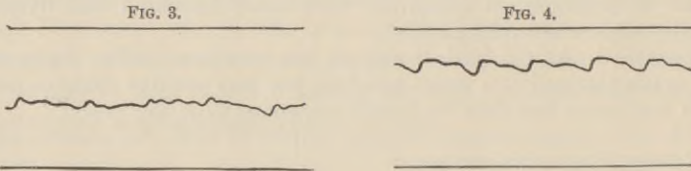
CASE II.—Mr. M., merchant, aged fifty-two years, consulted me on October 27 for increasing weakness, fatigue on slight exertion, with breathlessness and præcordial distress, of six months' duration. He was a small, pale, and slightly built man of quick, nervous movements. On examination I found that the percussion outlines of the heart were increased by two finger-breadths downward and to the left, and that there was marked intercostal retraction on cardiac systole. Over the whole of the cardiac area was heard a rough crepitation with both ventricular systole and diastole. At the apex, coincidentally with the impact of the apex against the chest-wall and at its site, was heard a soft, blowing murmur. At the aortic cartilage was heard a ventricular systolic murmur, somewhat harsh in character, which was transmitted upward to the root of the neck. The condition was believed to be an adhesive pericarditis, with secondary ventricular dilatation and thickened aortic valves consecutive to degeneration of the aortic intima.

Five drops of strophanthus, thrice daily, were administered, with the

result that the dyspnoea was markedly relieved when he reported on the 6th of the following month.

27th. He stated that he had been able to perform much more work without fatigue, and that this pain in the chest was entirely relieved.

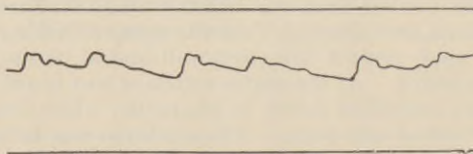
December 10. In addition to his treatment, which had been faithfully carried out, he was directed to make use of a claret-glass of Burgundy with each meal. His color was good, his eyes bright, and he felt as well as before his illness.



January 10, 1897. The patient is no longer troubled with dyspnoea, and since the last report has attended to his business without unusual fatigue. The cardiac area is but a finger's-breadth lower than normal and the heart-sounds are of good volume.

CASE III.—Miss A., aged thirty-eight years, suffered from rheumatic fever thirty years ago. For many years she had been prostrated by headaches, which occurred at intervals varying from one to six weeks, which often kept her in bed for twelve to thirty-six hours. She had always suffered from palpitation, dyspnoea, various dyspeptic symptoms, and general nervousness, which had been treated by various physicians, some of prominence, with but temporary relief. Three years ago hyperopic astigmatism was discovered and corrected, and rest in bed with appropriate medication and diet for four months insisted upon. As a result, compensation was established, and for the first time in her life she was able to perform her social duties without headaches or other annoying symptoms. On November 20th, after a series of visits to various summer-resorts, she consulted me for the relief of intestinal symptoms which had persisted for several months. Of the marked physical signs which were present before her treatment three years ago none remained save the enlargement of the area of cardiac dulness to the left and downward for one and one-half inches, and a harsh, ventricular systolic murmur at the aortic cartilage, and at the same place a ventricular diastolic murmur, which, although not replacing the dulled second sound, was fairly rough in character. The first sound was by no means so loud, prolonged, or booming in quality as at the close of her prolonged stay in bed. Beyond abdominal tenderness and distention there were no physical signs in connection with the diarrhoea.

FIG. 5.



Four drops of strophanthus, thrice daily, were ordered and five grains of bismuth naphtholate after meals.

November 28. The intestinal symptoms have entirely disappeared and the patient can endure more fatigue.

December 6. On coming to my office after a fatiguing morning of shopping she said that she felt dizzy, nauseated, and that her heart palpitated.

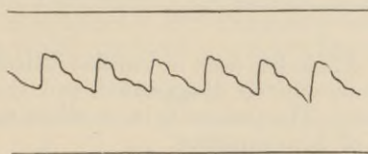
The dose of strophanthus was now increased to five drops and caution as to overfatigue enjoined.

16th. Since the last report, although shopping has been persisted in, the patient feels well.

20th. The improvement still continues, the only complaint being dyspeptic symptoms following too frequent and elaborate dinners.

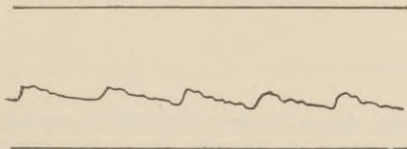
26th. The dyspeptic symptoms are now relieved. The first sound is lengthened, louder, and booming in character. The apex-beat is now vigorous and the first sound has regained its former loudness.

FIG. 6.



CASE IV.—Miss D., aged twenty-two years, was under my care for several months at the age of sixteen, suffering from diabetes mellitus, which had persisted for three months before coming under my treatment. Although at the outset the sugar was from 4 to 6 per cent. in amount and the patient markedly emaciated, yet it disappeared within ten months, and, with the exception of two occasions of unusual dietary indiscretion, it has never since been found. The patient has regained her flesh and spirits, and indulges in a fair amount of starchy and a limited quantity of sweet food. At times, however, she has suffered from palpitation, cardiac distress, and suffocation, and these attacks are generally justly attributable to fatigue, mental disturbance, or dietary follies. The underlying physical cause is undoubtedly the degeneration of myocardium, which so generally accompanies saccharine diabetes and so frequently contributes to the fatal termination. On November 5th

FIG. 7.



the patient complained of the above symptoms, due on this occasion to excessive fatigue. Beyond tenderness on pressure over the right hypochondrium, and a slight, soft, blowing, ventricular systolic murmur, heard loudest at the apex, nothing definite was found. This tracing is unsatisfactory, as are the others, because of a deep-lying radial artery in a small wrist.

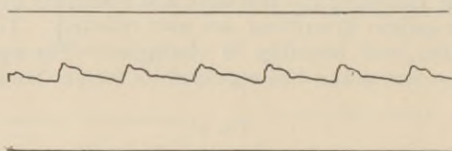
Two drops of strophanthus, thrice daily, were ordered and a moderately strict diet, with confinement to the house, was recommended.

One week later the amount of the drug was increased to three drops at each dose and considerable improvement noticed.

December 7. The patient is again in her usual health and attends to her numerous social duties.

15th. The strophanthus is now diminished to two drops, and there has been no palpitation nor suffocative sensations.

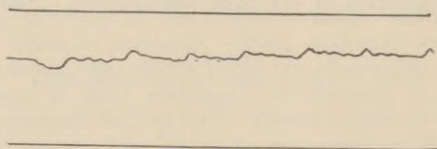
FIG. 8.



January 4, 1897. There has been no cardiac distress since last report. The murmur has now entirely disappeared, and the dilatation of the left ventricle relieved. The patient is in excellent spirits and claims to be entirely relieved of her symptoms.

CASE V.—Mrs. B., aged sixty-five years, has been dyspnoic on exertion for several years and unable to walk but a short distance and not at all in a strong wind. On November 25, 1896, when I first saw her, she was confined to her bed, unable to lie down, coughing almost incessantly and panting for breath. On physical examination I found cyanotic lips, swollen feet and ankles, and general emaciation. At the apex, which was displaced downward and to the left, was heard a loud, blowing murmur, synchronous with the impact of the apex against the chest-wall; the pulmonic second sound was accentuated; besides dulness from the angle of the scapula downward there was a large number of moist râles of various sorts and sizes. The tongue was extremely foul and heavily coated. The expectoration was profuse, in yellowish, discrete masses and in much liquid.

FIG. 9.



I administered six drops of strophanthus every six hours and one one-hundredth of a grain of glonoin every two hours. Great relief followed, and after a few nights she was able to lie down.

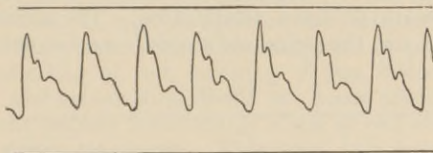
December 1. The general condition has markedly improved; sleep is possible for two or three hours at a time, and the appetite has increased slightly.

The glonoin is now omitted and the strophanthus diminished to three doses *per diem*.

7th. It was noted that the amount of expectoration had still further

diminished and that it was less purulent. The tongue still remains coated in spite of various local treatment. Aqua chlori (U. S. Ph., 1890), in drachm doses well diluted, every two hours was now ordered.

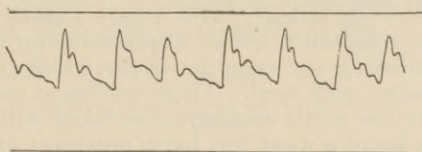
FIG. 10.



25th. The tongue is now clean; all symptoms of œdema have disappeared. The chlorine-water is now omitted. The patient sleeps for four or five hours without cough and the expectoration has become less in amount.

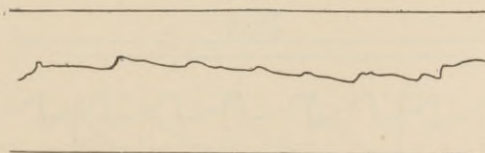
January 12, 1897. The dyspnœa is noticeable only on ascending stairs and all symptoms of pulmonary and alimentary congestion have disappeared. The apex is still displaced to the left, but the heart-sounds are distinctly louder.

FIG. 11.



CASE VI.—Mrs. H. B., aged thirty-five years, during the past year has undergone great mental and physical strain. She complains of feelings of suffocation, stabbing pains in the left chest, shortness of breath, palpitation on exertion, and general nervousness. Within the past two years she has grown quite stout. Further questioning elicited the history of various dyspeptic symptoms and that profuse menstruation had resulted in considerable prostration at the time of her periods. December 1st it was found that the apex-beat was slightly moved to the left; at its site was distinctly heard a ventricular systolic murmur; there was also a faint murmur heard, at the same period of the cardiac revolution, at the aortic cartilage, and there was an accentuation of the pulmonic second sound. The feet were slightly œdematous, the lips of good color, but there are no pulmonary signs.

FIG. 12.



Four drops of strophanthus were ordered and the patient enjoined to remain recumbent during the menstrual epoch.

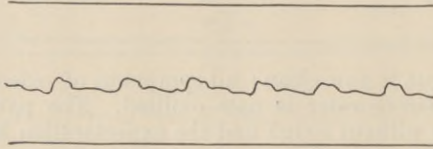
December 8. There has been considerable improvement in the palpitation and general nervousness, the thoracic pain is less, but the breath-

lessness still continues. For the past three days, during menstruation, she has remained in bed, and the flow is diminished.

29th. The dyspnœa still continues, although the palpitation and nervousness are better than at last report.

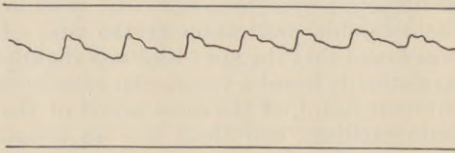
January 6, 1897. The dyspnœa has markedly improved and the palpitation and nervousness have disappeared. The murmur at the apex is no longer heard and the pulmonic second sound is normal.

FIG. 13.



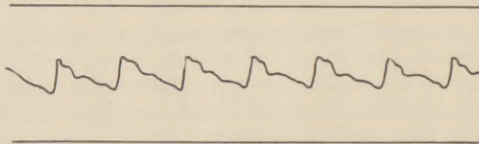
CASE VII.—Miss A., aged twenty-four years, a subject of chronic bronchitis with acute exacerbations; there is also found a pleuritic adhesion at the right base behind. She has suffered for several years from palpitation on excitement or on exertion, faintness and excessive nervousness and fatigue easily induced. On November 19 she was excessively pale as to lips and tongue. Her fingers showed enlarged joints. The abdomen was tympanitic, tender to pressure over stomach, and she then spoke of the distress and expulsion of gas, which generally occurred about two hours after each meal. There was found no increase of cardiac dulness. At the aortic cartilage, coincident with the ventricular systole, there was heard a short but harsh murmur; at the apex at the same time was found a faint, dull murmur transmitted upward into the third interspace. The examination of the urine showed a specific gravity of 1026, excess of urates and chlorides, but no sugar, albumin, peptones, nor bile.

FIG. 14.



Three drops of strophanthus were ordered to be taken after each meal and two drachms of sodium phosphate on rising in the morning.

FIG. 15.



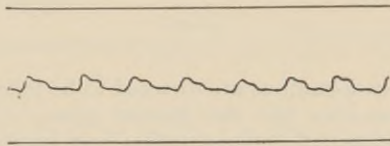
December 6. The palpitation and nervousness have improved. The dyspeptic symptoms have lessened, and she has borne more than usual fatigue without lasting exhaustion.

16th. There are no longer dyspeptic symptoms or signs. The apical murmur is not heard, while in addition the heart-sounds are louder and approaching the normal in quality.

30th. The improvement continues, and it seems fair to conclude that the anæmia was consequent to the circulatory disturbances.

CASE VIII.—Mrs. T., aged forty-five years, has suffered from dyspnoea for about ten years. She also complains of palpitation, pain in back of head, swelling of feet, belching of gas, distention of stomach, and wandering abdominal pains about two hours after eating. During the past year she gained considerably while at rest and under a meat diet and appropriate treatment. This gain, however, was lost during a month's sojourn in Switzerland last summer. When seen on November 2, shortly after her return from Europe, she was intensely dyspnoic, lips purplish, and suffering from palpitation with considerable præcordial distress. The apex-beat was indistinct, and, on account of adipose tissue, difficult to locate. There was heard at its supposed site, coincident with the first sound, a very faint murmur. The sound produced by closure of the aortic valves was not sharp nor distinct. There was distinct tenderness upon pressure over the liver, which was apparently enlarged. The feet and ankles were swollen, especially on the left side. The urine contained a trace of albumin and peptones, was of a specific gravity of 1026, with increased phosphates.

FIG. 16.



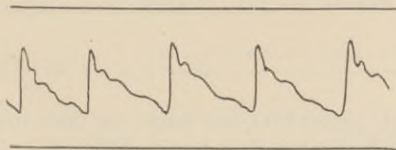
Four drops of strophanthus were ordered to be taken after each meal, a meat-diet prescribed, two drachms of sodium phosphate to be given upon rising, and freedom from her social duties enjoined.

17th. It was reported that headache at base of brain was severe on rising in the morning, but that the swelling of the feet had disappeared. The strophanthus was now increased to five drops, thrice daily.

22d. The tenderness over the liver was absent, the dyspeptic symptoms markedly ameliorated, and palpitation has only been present upon unusual exertion.

December 15. The dyspnoea is steadily improving and the cyanotic lips are now normal. The apex-beat is more distinct and felt with less difficulty.

FIG. 17.

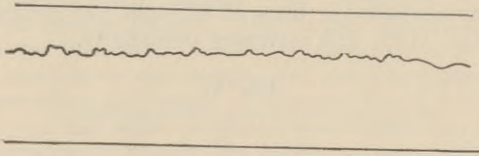


18th. Within the past three days unusual demands upon the patient's strength have been made and have been met without losing ground.

January 6, 1897. The improvement still continues and the dyspeptic symptoms are completely relieved. The headache has entirely disappeared. The murmur formerly heard at the apex is absent and the aortic second sound sharp and distinct.

CASE IX.—Mr. H., superintendent, aged forty-five years, generally well, began to lose flesh rapidly as early as February of this year. With this he became breathless, suffered from fainting sensations, headaches, trembling, and generally was unable to attend to his responsible duties. During the summer he took a five months' complete rest in the country, regained about one-half of the flesh lost, and became more cheerful. On November 1 he was noticeably thin in flesh, but with excellent digestion. There was no swelling of the feet or signs referable to the digestive tract. The apex-beat was diffused, displaced outward and in the sixth intercostal space. At the apex and synchronously with its impact is heard a loud, rough murmur; at the same point is heard, with the auricular systole, a harsh murmur shading into the former. The pulmonic second sound is somewhat accentuated; there is nothing noticeable about the aortic.

FIG. 18.



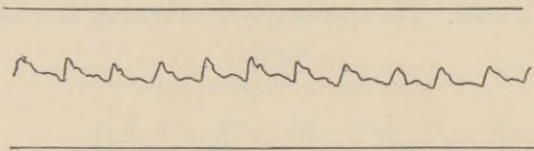
Three drops of strophanthus are directed to be taken after each meal and the importance of a full diet insisted upon. Care in ascending stairs and the avoidance of undue exertion were regarded as important.

November 14. There is a fair gain of weight, and faintness has not been noticed. The headaches and trembling are lessened.

December 13. He has attended to all of his daily duties during the past month and declares that the palpitation is absent. The pulmonic second sound is less accentuated, while the first sound has much improved.

January 3, 1897. The patient is now able to ascend stairs with comfort, attend to his daily duties, and is steadily regaining his customary weight. The murmurs still persist and the first sound is now loud, prolonged, and booming.

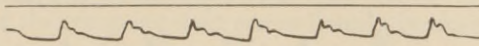
FIG. 19.



CASE X.—Mrs. C., aged fifty-two years, has been increasing in weight for six years. With this she has found difficulty in getting sufficient exercise, and for the past year her feet have been constantly swollen. Besides she complains of gaseous eructations, obstinate constipation, and that she no longer has any ambition. On November 7th the apex-

beat was found to be in the sixth interspace, diffused, and weak. At this point was heard a rough, blowing, auricular systolic murmur. At the aortic cartilage the valve closure was indistinct; the pulmonic second sound is accentuated. In addition to the œdema of the feet there was marked swelling of the hands and face. The urine was thirty-four ounces in quantity, of a specific gravity of 1027, with increased urea, alkaline phosphates and sulphates.

FIG. 20.

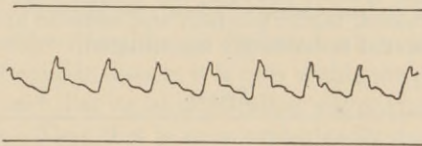


Four drops of strophanthus were directed to be taken three times daily, with five grains of taka-diastrase after each meal.

16th. It was noted that the œdema had entirely disappeared, the dyspeptic symptoms were noticeably better, and the patient was enabled to take some exercise.

December 16. The intestinal symptoms having disappeared, the diastase was omitted. The strophanthus was reduced to three drops, and the patient is more energetic.

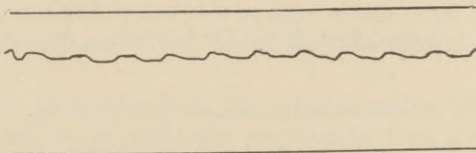
FIG. 21.



January 11, 1897. The apex-beat is stronger and the pulmonic second sound no longer accentuated. She asserts that she is in her former health and accustomed spirits.

CASE XI.—Miss E. F., aged forty-two years, has suffered from vague thoracic pains for several years, persistent headaches, palpitation on exertion, and attacks of unconsciousness. She is pale, of slight build, and thin. Upon physical examination, October 7, there was but little to be found excepting trembling on exertion, apex-beat weak, but in normal position, and a soft, ventricular systolic murmur, heard loudest at the apex.

FIG. 22.



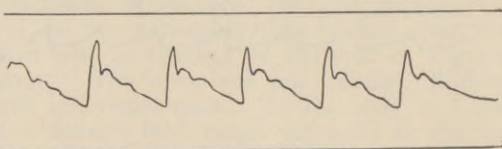
Two drops of strophanthus were directed to be taken thrice daily, a generous diet, and moderate outdoor exercise each day.

17th. There was less complaint of palpitation, lessened headaches, and an improved appetite. The outdoor exercise has been continued every fair day, and there has been no attack of unconsciousness.

November 26. The murmur has now disappeared and there is marked general improvement.

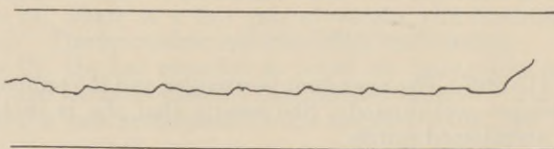
December 15. The trembling has become less and the apex-beat strong, with a coincident improvement in the first cardiac sound.

FIG. 23.



CASE XII.—Mrs. E., aged forty-seven years, suffered from acute poly-articular rheumatism about fifteen years ago. Since then she has been subject to palpitation, extreme breathlessness on exertion, occasional attacks of fainting, and almost every night to tormenting dreams. She has lost much flesh and her feet are considerably swollen at night. On October 2d the apex-impulse was found well out in the mammillary line, one and one-half inches below its normal position. At the apex is heard both an auricular and a ventricular systolic murmur, the former harsh, the latter soft and somewhat musical. At the second right aortic cartilage is a ventricular systolic murmur, but neither loud nor rough. The first sound is shortened, higher pitched, and metallic in character. The pulmonic second sound is markedly accentuated.

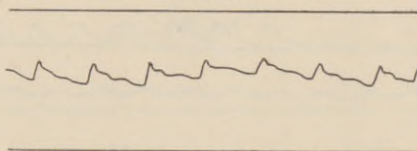
FIG. 24.



Four drops of strophanthus was given after each meal, two drops at bedtime, and quiet insisted upon.

27th. It was found that the dyspnoea had been greatly benefited and the sleep more peaceful. There had been but one attack of fainting.

FIG. 25.



November 2. The palpitation was much lessened and general improvement continued. The first sound is of lower pitch, longer in duration, and approaches the normal in character.

December 25. The palpitation is no longer complained of and dyspnoea

is noticed only on violent exertion. There has been no fainting during the past month and her sleep has been more free from dreams.

January 6, 1897. The patient now sleeps well at night and all symptoms are markedly better. She is gaining in flesh. The apex-beat is still one inch below its normal position, but the first sound is booming in quality.

The careful study of these cases, which present the different varieties of cardiac disease, leads me to believe that in them was obtained a more speedy relief of the symptoms than can ordinarily be expected from the use of digitalis or of other drugs commonly used.

Fraser presents a most interesting study of the action of strophanthus upon the heart, finding it eight times more powerful than adonidin, scillitoxin, or erythrophloëin; twenty times more than helleborein, thirty times more than convallamarin, three hundred times more than some specimens of digitalis, and thirty thousand times more powerful than caffen. On the contrary, upon the bloodvessels digitalis acted fifty times stronger than strophanthus.

The advantages which strophanthus possesses over digitalis may be summed up as (1) greater rapidity, modifying pulse-rate within an hour (Potter); (2) absence of vasoconstrictor effects; (3) greater diuretic power; (4) no disturbance of digestion; (5) absence of cumulation; (6) greater value in children; and (7) greater safety in the aged.

When we consider that although digitalis has been in use since 1785 in the treatment of cardiac disease, it is only within the past ten years that it may be truly said that its administration was productive of uniformly excellent results. That this is so is undoubtedly due to the fact that the greatest danger from its use—namely, the marked vaso-constriction—has been to a considerable degree obviated by the common practice of the coincident administration of a nitrite. Strophanthus was first brought to the notice of the French Academy of Medicine in 1865, but its first practical demonstration as a valuable heart-remedy came twenty years later, when Fraser published the results of his long-continued and patient researches. With the wider and more rapid dissemination of knowledge which obtains at the present day we may hope that within a comparatively few years we may have strophanthus used as carefully as is digitalis today. That it possesses distinct advantages over the latter drug is undoubted, and it is equally certain that it is free from the greatest danger which the use of digitalis entails—namely, vaso-constriction.

We may say that success in the administration of strophanthus requires: 1. An active, well-made preparation from a reliable source. 2. Avoidance of its use in fully or over-compensated hearts, in those which present advanced muscular degeneration or mechanical defects of high degree. 3. The use of not too large or too frequently repeated

doses. From my own observations, the dose of five drops of a reliable tincture three or possibly four times a day is sufficient.

In conclusion, I believe that, considering the limitations just enumerated, strophanthus is the drug of choice in :

1. All cases in which we wish to establish compensation.
2. All case of arterial degeneration in which a remedy which causes more energetic cardiac contractions is required.
3. All cases of cardiac disease where diuresis is necessary.
4. All cases of weak or irritable hearts.
5. All cases of cardiac disease in childhood or old age.

749 MADISON AVE., January 14, 1897.

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