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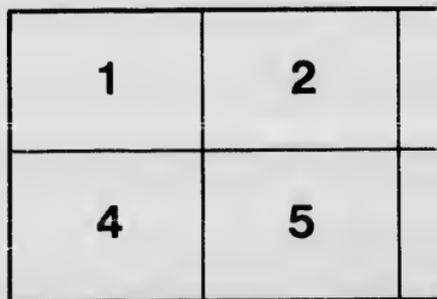
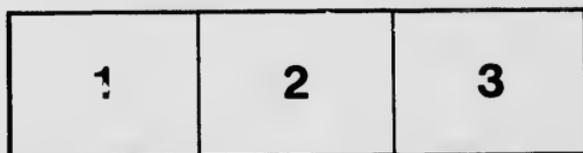
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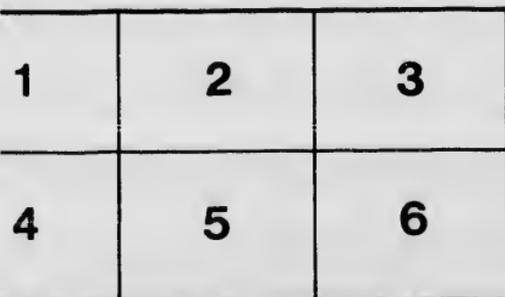
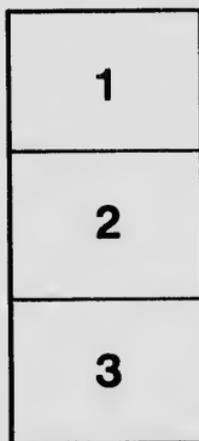
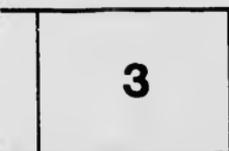
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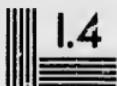
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CHEYNE-STOKES RESPIRATION

AND

RENAL CALCULUS.

BY

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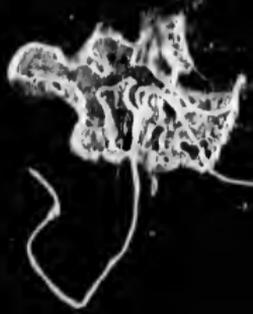


CHEYNE-STOKES RESPIRATION AND RENAL CALCULUS.

BY SIR JAMES ALEXANDER GRANT, M.D., F.R.C.P., LOND., &C.,
Consulting Physician, General and General Protestant Hospitals, Ottawa City.

(Paper read at the Canadian Medical Association, Hamilton, Sept., 1887.)

Mrs. G., aged 46 years, stout habit of body, and mother of six living children. Never had gout or rheumatism. No history of consumption in family. Neither neurotic herself nor has a neurotic ancestry or relatives. She had never experienced any difficulty in micturition till about five years ago, when she noticed there were voided a few small concretions, composed of uric acid, and attended by a moderate degree of renal colic, which subsided shortly after the escape of the calculi. For the past few years she has been subject to occasional pains in the lumbar region, but at considerable intervals. Complains at times of frontal headache. No cardiac palpitation or chest trouble, the functions of heart and lungs being normal. In May 1886, was seized suddenly with great difficulty in her breathing, almost approaching suffocation, the respiration, at first deep sighing and frequent at times, afterwards becoming slow and oppressive, with a sense of inability to fully expand the chest. Frequent yawning was also observed; the facial expression was pale, anemic, and anxious. This condition continued more or less for fully two hours (the most acute stage occupying about half an hour), subjected to the most vigorous measures for relief, and gradually subsided, leaving no unfavorable symptom, except a feeling of depression, and uneasiness fearing a recurrence of the attack. Throughout, the respiratory movements were lessened, doubtless the result of lowered activity in the respiratory centre. Occasionally the shallowness and infrequency of breathing assumed rhythmical variations of intensity, associated with the usually well defined periods, alternating by an increase and decrease of



breathing power, with the abnormal *pause*. Strange to say, she continued conscious throughout and fully aware of the surrounding circumstances, and quite unable to rid herself of the "Cheyne-Stokes grasp," doubtless connected with *some subtle molecular state* of the nerve elements, which under ordinary circumstances guide, direct and control normal respiratory power.

On July 24th, had an exceedingly severe attack in the chest, with precisely the same series of symptoms, lasting fully two hours. Again on the 25th July, precisely the same state of respiration suddenly developed, and with varying degrees of intensity spread over a period of nearly three hours, both attacks being preceded by severe pains in the region of the kidneys. Almost immediately afterwards a copious discharge of urine took place, and a considerable number of small concretions were voided, veritable calculi, pale reddish color, crystalline, and under a magnifying glass their glistening facets were quite apparent. The urine was acid, and rather highly colored, but free from albumen and tube-casts. At this stage the renal pains diminished and the chest symptoms disappeared, so much so that the following day it was quite remarkable to observe the ease, comfort and regularity of pulmonary action. On several occasions when severe pain was experienced in the lumbar region, a sense of chest contraction was felt and associated with a dread of a renewal of former difficulty in the breathing.

For the past six months enjoyed very good health and spirits, and entirely free from any chest complication whatever. Entire absence of pain in the region of the kidneys, voids urine regularly, quite free from calculi, rests comfortably, and at present enjoys excellent health in almost every particular.

During the progress of this case, in the stages of chest difficulty, the action of the heart and pulse were irregular, and proportionally so, to the intensity of interference with normal respiratory action.

Rosenbach (in "Eulenburg's Encyclopædia") adverts to the condition of the heart and pulse, and says that not infrequently no perceptible changes can be observed, and that at times, however, very interesting changes are noticeable. In certain cases the pulse at the beginning of the pause is quicker and of dim-

inished tension. During the ascending stage of the breathing the pulse diminishes in frequency and the tension increases, so that during the deepest inspiration we have the lowest pulse and the highest blood-pressure. There is a case mentioned by "Hesky," where the heart came to a complete stand-still during the pause, and when the stage of full dyspnœa was reached the pulse was normal.

Powerful electric irritation of the phrenic nerves during the pause, to the extent of producing contractions (several in number) of the diaphragm, has no effect on the after ascending and descending course of the breathing. This shows that the phenomenon is not dependent on any want of oxygen in the blood, which is a very important point. In diseases where Cheyne-Stokes phenomenon has been present in slight degree, such has been observed to be greatly increased by the exhibition of narcotics, as opium, chloral and potass. bromid. Nitrite of amyl, on the contrary, has a most beneficial action.

Cheyne-Stokes respiration is liable to occur in those cases where the nutrition of the brain is interfered with; appears in cerebral compression from hemorrhage, tuberculosis and purulent meningitis; in œdema of the brain from anæmia and in cases of tumor of the brain; in various diseases of the heart, muscle insufficiency, fatty heart, insufficiency of the valves, especially of the aorta; in severe diseases of the lungs, such as croupous pneumonia (especially of drunkards) and bronchitis of children; and, lastly, in severe blood losses. The phenomenon may in some cases disappear for weeks and then reappear, as in the renal case just presented. Such, also, has been observed in chronic heart diseases. Nearly always seen when a patient is partially or completely comatose. This condition is not absolutely fatal. Recovery has been noticed in some cases of œdema of the brain from uræmia, as well as in the case just reported.

It is interesting to note some of the views as to the nature of this phenomenon. Filchner favors the view that it is due to changes in the circulation. He considers that contraction of the arterioles of the medulla oblongata is at the bottom of it; that owing to contraction of these vessels less blood goes to the medulla, and that in consequence there is an accumulation of

carbonic acid, which irritates the respiratory centre and causes the rapid breathing. This contraction is succeeded by marked dilatation, and in this manner the medulla is supra-saturated with oxygen, which brings about slower respiration and finally a stop, to be again followed by contraction and its resulting quickened breathing.

Rosenbach contends that it is due to a periodically recurring debility of the respiratory centre, that the cause is to be found in the nerve centres and is entirely independent of the circulation. As instances of similar kind, he refers to a periodically recurring debility of the vaso-motor centre, clinically exemplified in alternate paleness and redness. He also instances certain pulse abnormalities as illustrative of a like affection in another nerve centre, viz., "the vagus centre." The breathing period he compares, in Cheyne-Stokes phenomenon, to the normal respiration, and the pause he compares to the perceptible pause between inspiration and expiration. He, in fact, sees in this phenomenon only a very exaggerated degree of the normal process of breathing. As another analogous condition he instances the state of the pupil and the activity of the brain. When the brain is tired or exhausted, sleep is induced, and during sleep the pupils are contracted. In the moment of waking the brain is active and the pupils dilated. He compares the condition of the pupils in sleep to the pause in the Cheyne-Stokes phenomenon. In both instances the condition of the central nervous system is the same, markedly diminished irritability.

Rosenbach's views may be briefly stated as follows: Under the influence of certain anomalies of brain nutrition (in cerebral diseases, or the lungs or circulation) there arises in the brain in general or in some of its centres, *especially the respiratory centre*, localized disturbances which depress the normal activity of the affected part, and through this there arises remissions or complete intermissions in the activity of the centre (pause in breathing). So soon as the centres have a short rest (pause) the activity returns, an increased activity (increased breathing), but this increased duty or work soon again tires the centre, and then we have a repetition of the same abnormal action. These

views of Rosenbach's are now accepted by the best authorities on this subject.

In cases where there are signs of general plethora about the head, Rosenbach highly recommends leeches, and in all such cases it is important that narcotic treatment should be avoided. Stokes, who first observed this phenomenon, says he never witnessed it except in cases of fatty degeneration of the heart and a few weeks before death; Cheyne, however, did not refer the symptom especially to that form of disease. Subsequent observations led them to believe that this phenomenon is not rare, and occurs in a variety of diseases.

This problem rests on a foundation as yet not completely defined. It may be cardiac or renal, or both, as to origin. When the chemistry of the system becomes disturbed through the introduction of abnormal elements of secretion, what an important part arterio-fibrosis plays, or even the introduction of *toxic* elements into the blood, resulting in abnormal actions and reactions on nerve elements, thus interfering with the performance of their normal functions. As time passes on, we may have additional clinical phenomena to guide and direct as to the formation of a positive opinion as to cause and effect in this interesting respiratory phenomenon, but for the present it will be acting cautiously to adopt no hurried conclusions.



