circularly with fluid, and after carefully arranging that the size of the arteriograph and its compressibility were such that it was within the power of the artery to pulse the whole compressing mass of its walls.

Erlanger does not seem to realize that what makes the armlet on the upper arm as "compressible" as his arteriograph is not the beat of the brachial artery alone, but the simultaneous throb of the whole mass of tissues below the armlet.

Further, the genesis of Korotkoff's sounds owe their fundamental origin to this mechanism brought into play by the compression of the surrounding tissues. Erlanger states: "Hill, Flack, and McQueen maintain, *without offering any experimental evidence* for their view, that the compressing armlet converts the compressed area of the arm into a resonating mass; the pulse is not damped down in the labile arteries, but strikes the blood, which fills to distension, not only the main artery, but every patent arteriole throughout the mass, and causes the whole tense mass to vibrate."

It is difficult to believe that Erlanger has followed the series of researches of Hill, Flack, and McQueen. In their work they show how the veins are compressed and the peripheral resistance rises as compression of the armlet rises; how this rise in pressure stretches the arterial wall and produces the dull sounds; how the blood is congested in the mass of tissues under the armlet. Consequently, through this action of the armlet on the tissues, both under it and beyond it, each pulse strikes the blood, and the arterial wall experiences an additional strain as the kinetic energy of the flow of blood meets the obstacle of contained blood in front of it. Erlanger describes this phenomenon as water hammer, but the use of this term brings out no new idea to that already demonstrated by Hill, Flack, and McQueen.

We conclude, then, that—

1. To give accurate information on the factors concerned in blood pressure measurement, a schema must permit of compression being applied to an artery in a pulsable and not rigid manner, and a rise of peripheral resistance *pari passu* with increasing compression must be arranged for.

2. When an armlet or bag of Hill's pocket sphygmometer is made to compress an artery where it lies on bone with little tissue round it—for example, temporal, dorsalis pedis, aberrant radial—it deforms the artery and prevents the passage of the pulse at a pressure less than diastolic. The finger of the physician acts in the same way, and therefore cannot estimate the systolic pressure accurately.

3. Compression of the tissues surrounding the artery so as to block the venous outlets is essential to accurate blood pressure measurement. This congests the blood beneath and beyond the armlet or bag. The pulsing of the congested mass of tissues renders armlet or bag capable of delivering a circular compression to the artery, and one which yields to the pulse and prevents deformation of the artery until the systolic pressure is overtopped.

4. Sufficient area of veins must be blocked if the blood pressure instrument is to be an accurate one, consequently the bag or armlet must be broad. The bag, together with the observer's hand, enclose the forearm, and so makes the bag of Hill's pocket instrument equivalent to the armlet. Failure to make the bag broad accounts for many inconsistencies in the literature of blood pressure measurement.

REFERENCES.

Studies in Blood Pressure Estimations by Indirect Methods, I and II, by Joseph Erlanger, *Amer. Journ. of Physiol.*, vol. xxxix, No. 4, February, 1916; vol. xl, No. 1, March, 1916. Hill, McQueen, and Flack: *Proc. Roy. Soc., B.* vol. lxxxvii, p. 344, 1914, and vol. lxxxviii, p. 517, 1915. MacWilliam and co-workers: *Heart*, vol. v, p. 153, 1914, and vol. iv, p. 393, 1913.

For some years rabies had decreased in France almost to vanishing point. Owing to the large number of dogs which since the war have taken to a wandering life and thus escape police control, there has been a considerable recrudescence of the disease in many departments. The number of persons bitten by dogs suspected of rabies and treated at the Paris Pasteur Institute was 373 in 1914 and 654 in 1915. In 1916, from January 1st to May 13th, it was 420; this figure, if the same rate of progression is maintained, will give a total of more than 800 for the whole year. On June 9th the Paris prefect of police issued an order that in the streets all dogs must be led in a leash or muzzled and have a collar bearing the name and address of their owner.

THE SYSTOLIC PRESSURE IN ACUTE NEPHRITIS.

By RODOLPH G. ABERCROMBIE, M.D.,
TEMPORARY CAPTAIN R.A.M.C.

I HAVE recently treated at a base hospital in France several hundred cases of nephritis occurring amongst the soldiers of the Expeditionary Force, and have taken advantage of the opportunity thus afforded for the study of the blood pressure during the acute phase of this disease.

The characters of war nephritis have already been described;¹ here it may be said that it presents the usual features of an acute nephritis of moderate severity, and that, as in other forms of acute nephritis, the blood pressure appears to be always raised at some period during the course of the disease.

Duration of Elevation of Pressure.

In cases of average severity the pressure was usually raised for a period of from five to ten days after the patient's admission to hospital; not infrequently, however, the elevation persisted for several weeks, so that the patients were transferred to England with the pressure still high.

Range of Systolic Pressure.

During the early stages the systolic pressure usually ranged between 135 and 180 mm. Hg; exceptionally, and particularly in association with convulsions, it reached 200 or 210. The pressure was thus lower than that usually seen in chronic nephritis; indeed, a pressure of over 200 was found to be presumptive evidence that the disease was really of long standing.

Diurnal Variations in Pressure.

A striking feature was the wide diurnal variation which often occurred between the morning and evening blood pressures. Just as in certain diseases there is a wide difference between the morning and evening temperatures, so in this form of nephritis some agent appears to be at work which causes an evening rise of blood pressure and a morning fall; the difference between the morning and evening pressures may be 20, 30, or even as much as 60 mm. Hg (Chart 1 and Chart 2).

All the charts here reproduced show the systolic pressure taken twice daily, namely at 10 a.m. and 6 p.m., and recorded in millimetres of mercury. The palpatory method was used, with the patient recumbent; a tambour sphygmomanometer (Tycos) was employed.

If Charts 1, 2, 3, and 4 be examined, it will be noticed that had the morning blood pressure alone been recorded, a totally erroneous idea of the course of the pressure would have been obtained; indeed the chart would have been as misleading as the temperature chart of a case of tuberculosis upon which only the morning temperatures were shown.

When the blood pressure was falling from day to day, it usually did so in a series of morning remissions and evening rises, thus forming a descending "staircase"

CHART 1.—Systolic pressure, taken twice daily at 10 a.m. and 6 p.m., and recorded in millimetres of mercury. "Staircase" descent.

(Chart 1). Exceptionally, when the pressure fell unusually rapidly, the evening pressure was lower than that

CHART 2.—Systolic pressure, taken twice daily at 10 a.m. and 6 p.m., and recorded in millimetres of mercury.

recorded on the preceding morning (Chart 3); such a chart may be compared to that of a case of pneumonia terminating by crisis.

CHART 3.—Systolic pressure, taken twice daily at 10 a.m. and 6 p.m., and recorded in millimetres of mercury. Termination by crisis.

A frequent type of record is shown on Chart 4. During the early phase of the disease the pressure rises and falls irregularly; a stage is then reached of morning remissions

CHART 4.—Systolic pressure, taken twice daily at 10 a.m. and 6 p.m., and recorded in millimetres of mercury.

and evening rises forming a descending "staircase"; subsequently the pressure becomes subnormal, rising later to the normal.

Association with other Symptoms.

In association with uraemic convulsions (14 cases) the pressure was found to be always raised, but to a variable extent; in some cases it was 200, in others considerably lower; in one severe case the systolic pressure taken a few hours before the fit was 135. Immediately after the

fit the pressure was often over 200, probably owing to the great muscular exertion.

Two symptoms, usually nocturnal in incidence, appear to be specially associated with the great evening rises of pressure—namely, paroxysmal dyspnoea and headache. The connexion between these symptoms and the rise in pressure is undergoing further investigation.

Usually the amount of albumin diminished *pari passu* with the fall in pressure, although residual albuminuria often persisted after the pressure had fallen to the normal. Sometimes, however, the two curves bore no relation to one another. During convalescence transient elevations in the blood pressure occasionally occurred; sometimes they followed an advance of diet, but often they formed a part of a general recrudescence of symptoms for which no cause could be assigned.

The estimation of the blood pressure was found to be of great value both in diagnosis and in judging of the patient's progress. As noticed by Captain W. Langdon Brown,² those patients appear to do well in whom the pressure is at first high and rapidly falls to the normal. Often, however, the morbid process in the kidney appeared to continue after the pressure had fallen to the normal.

Conclusion.

The blood pressure was found to be always raised during some stage of the course of the disease, although not to so great a height as is the case in chronic nephritis. Wide diurnal variations in the pressure were usually present, the pressure being highest in the evenings.

REFERENCES.

- ¹ Abercrombie: BRITISH MEDICAL JOURNAL, October 9th, 1915.
- ² Langdon Brown: Journal of Royal Army Medical Corps, July, 1915.

CONGENITAL CYSTIC KIDNEY WITH LOCAL DIFFUSE PERITONITIS: SURGICAL DESTRUCTION OF PART OF KIDNEY: RECOVERY.

By JOHN D. MALCOLM, F.R.C.S. EDIN.,
SENIOR SURGEON TO THE SAMARITAN FREE HOSPITAL.

HYDATIDS may develop in the kidney, and a dermoid cyst containing hair has been found in place of that organ in a healthy sheep.¹ Apart from such rare conditions there are two chief forms of cystic kidney. In one an obstruction in some part of the large urinary ducts causes dilatation of the pelvis or calyces by modified urine, pus, or tuberculous matter. Retention cysts thus formed are by far the commonest cystic kidneys. Congenital cystic kidneys are altogether different. In them there is no evidence of obstruction in the renal pelvis or in any lower portion of the urinary tract. The whole renule is transformed into a mass of small cysts, from about half an inch in diameter downwards, with generally a few larger cavities. The walls between are flattened by pressure, so that an irregular honeycomb appearance is presented on section. The cysts usually contain a clear fluid, but in one specimen various cysts contained a transparent fluid, a dark yellowish or brown and viscid substance, and turbid nearly solid material respectively.² Some cysts are dilated tubules, or Malpighian bodies, with their epithelial lining recognizable under the microscope. In other cysts there is no lining epithelium.

One specimen in the College of Surgeons' museum was associated with a similar cystic formation in the liver, and the condition has been found with multiple cysts in the spleen and thyroid. It also occurs with congenital imperfections such as heart malformations, spina bifida, and in anencephalic monsters. Frequently more than one member of a family is affected. These facts suggest, and it is generally believed, that a congenital cystic kidney is an abnormal development. Another view is that the condition is one of new growth, and, again, it has been attributed to an excess of connective tissue causing obstruction in the urinary tubules. It is possible that the pathology is not always the same, and there are cases of single cysts and of a few cysts in the kidney which are not associated with any obvious obstruction of the large ducts. These are generally unilateral, and whether they are modifications of the congenital cysts, or retention cysts,