by the inspiratory control valve L, and measured by the gauge P. The smaller the opening in the valve the larger will be the positive pressure during inspiration. At the end of inspiration, the vane falls to the vertical position. On expiration the vane swings to the right horizontal position, cutting off the light beam. Valve G is now turned so that the expired air passes through the 2-3 path. In passing through the soda-lime can K, the CO_2 of the expired air is absorbed. The positive pressure on expiration is controlled by valve M. With the valve wide open there is present only minimal pressures incident to the tubing resistance. With the valve partially closed, varying positive pressures may be obtained which can be read on gauge O.

When a positive pressure is desired in inspiration and a negative pressure in expiration both motor blower units must be used (and valve M). The motor blower unit which accomplishes suction is placed in the space Q 1-Q 2. This motor sucks from the soda-lime can K and blows toward the bag. We have been studying this type of mechanism in pulmonary emphysema.

The effects of positive and negative pressures on various types of dyspnea may be studied by this apparatus. The photo-electric cell operates with such speed that there is an exceedingly slight delay in the opening and closing of the solenoid valve, namely, one-tenth of a second. Although the apparatus is a delicate one and may be disturbed by rough handling, it has been used both in the laboratory and on the wards. We have chiefly employed it in severe asthma up to the present but other uses, such as for resuscitation, are being studied.

8946 P

Filtration Studies on Reactive Infusion Fluids.*

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This is a report of attempts to remove by various methods of filtration the reactive agent or agents from infusion fluids known to cause a reaction when injected intravenously. The reaction is characterized in the human being and in the dog by fever, often chills,

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vomiting and other gastrointestinal disturbances. The fever begins 30 to 45 minutes after injection, reaches its height in 2 to 3 hours, and then begins to recede until in 4 to 6 hours it has fallen to practically normal. In all our experiments in which a leucocyte count was made, there was also found a leucopenia accompanying the reaction reaching its highest intensity 45 minutes after the injection.

Seibert[1] showed that the cause of this febrile reaction in some distilled waters was a gram negative microorganism which has since been called the "pyrogenic bacterium". She further demonstrated that it was not the organism itself, but its products which caused the reaction and that the latter were filtrable through a Berkefeld filter.

In our experiments, 2 lots of reactive water were used, namely, water drawn from the tap and a rather turbid water from a laboratory aquarium. The water was boiled, filtered through fine filter paper and sodium chloride added to make a saline solution of 0.9%. The purpose of adding sodium chloroide was to avoid hemolysis.

The filtration methods used in this investigation were: (1) "dense" Jena filter crucible; (2) Berkefeld filter "W"; (3) Seitz E.K. filter of compressed asbestos; (4) Zsigmondy ultrafilters (gelatinous esters of cellulose) of graded porosity.

Dogs were used as test animals. Richet[2] gives the normal temperature of dogs as 39.25°C. or 102.65°F. In our study of 20 apparently normal dogs, the temperature was found to lie between 100.4°F. and 102.6°F. The temperature of any particular animal was found not to vary over 1.2°F. in the course of 3 hours. Accordingly, a rise of 1.5°F. within 3 hours after injection was taken as a definite fever. The leucopenia mentioned in a foregoing paragraph was also taken as a check on the fever in most of our experiments. In a study of the leucocyte count and its variation in the same 20 dogs, it was found that although the range of the "normal" count is rather wide, the hourly variations are never over 2000. A drop of 5000 or over is therefore considered a leucopenia. In most of the experiments here presented, the drop has been considerably more than this figure.

A typical reaction from tap water and from aquarium water is shown in Experiments 1 and 2 of the table. It will be noted that 45 cc. of the turbid aquarium water in a 16-kg. dog produced more of a reaction than 130 cc. of the clearer tap water.

That the reactive substance is removed neither by a Jena filter

[1] Seibert, F. B., *Am. J. Physiol.*, 1923, **67**, 90.

[2] Richet, C., *Dictionnarie de Physiologie*, 1885, **8**, 511.

TABLE I.

Each of the experiments in the following table is representative of at least 5 experiments.

Exp. No.	Kind of Water	Type Filter	Wt. of Dog, kg.	Vol. Injected cc.	Temp. Changes °F	Changes wbc. x 1,000	Symptoms
1	Tap		17	130	102.4-104.8		Shivering
2	Aq.		16	45	102.2-105.8	30.65- 6.4	" , diarrhea
3	"	Jena & Berk. W	13.5	150	101.4-105.9		" "
4	Tap	" " " "	14	150	102. -105.2	20.5 - 7.8	" "
5	"	Seitz	15	250	102.2-101.8	17.8 -15.	No symptoms
6	Aq.	"	16.5	250	102.6-101.6	21.2 -20.8	" "
7	"	Zsig. 1 sec.	13	250	102.1-105.3	10.2 - 4.8	Shivering, vomiting, prostration
8	Tap	" 1 "	14	250	102. -104.6	12.8 - 6.4	" , diarrhea
9	"	" 42 "	15	250	101.8-104.2	10.6 - 5.3	"
10	Aq.	" 42 "	16	210	102.4-104.5	40.3 -12.75	" , retching
11	"	" 200 "	16	325	101.8-101.4	17.05-16.8	No symptoms
12	Tap	" 200 "	15.5	350	102.4-102.2	16.4 -14.8	" "

wbc. = leucocyte
Aq. = aquarium
Berk. = Berkefeld "W"
Zsig. = Zsigmondy

crucible nor by the finest Berkefeld (W) is seen in Experiments 3 and 4.

Experiments 5 and 6 show that a Seitz E.K. filter removes it, evidence that the reactive agent is adsorbable.

Experiments 7 to 12 indicate that not all membrane filters remove the agent; the coarser filters allow it to pass, while 200 sec. filters retain it. From this it is concluded that retention of the agent by membrane filters is accomplished by sieving rather than by adsorption, and that the agent is of a particulate nature, the size of the particle being larger than the pores of a 200 sec. Zsigmondy membrane filter.

8947 P

Influence of Pathway of Infection on Pathology of Olfactory Bulbs in Experimental Poliomyelitis.

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The purpose of this communication is to describe the lesions produced by the virus of poliomyelitis when it invades the olfactory bulbs from the nose and to indicate their absence when the virus reaches the central nervous system of *Macacus rhesus* monkeys by other pathways. In monkeys succumbing to poliomyelitis after nasal instillation of virus, the olfactory bulbs show changes in the 5 outer layers, *i. e.,* the layer of olfactory nerve fibers, the glomerular, the external granular, the gelatinous, and the mitral cell layers. The lesions in the first 4 layers mentioned appear to be chiefly inflammatory, consisting of perivascular cuffing and diffuse infiltration of polymorphonuclear leucocytes, mononuclears, and lymphocytes. The involved mitral cells undergo necrosis and frequently show neuronophagia by polymorphonuclear and microglial cells.

These changes with some individual variation in extent, were observed in the olfactory bulbs of each of 10 monkeys given the virus by way of the nose, and it should be stressed that although the virus was instilled in both nostrils, the lesions were present, in at least 3 of the 10 animals studied, in only one of the olfactory bulbs. In 12 monkeys which succumbed to poliomyelitis after intracerebral, subcutaneous, or intrasciatic inoculation, examination of both olfactory bulbs revealed no lesions. It is apparent that a study of