vations so far made, the hypophysis of the female is much larger than that of the male, both in our thyroidless and control animals. If this point is established by further study, it may account for the fact that the ovary differentiates earlier than the testis.

In one of our experimental animals, the thyroid regenerated, and then hypertrophied. The animal underwent metamorphosis a month before the normal time, and at a size about one third normal. Its ovaries were in a stage of differentiation, much further advanced than normal. Its hypophysis could not be studied on account of poor fixation.

The various other organs and ductless glands of the thyroidless animals are being studied at this time. In general they are all larger than normal, but we have not yet determined whether there is present true hypertrophy or whether the size is merely proportional to the size of the larvæ which are larger than normal.

172 (1350)

Generalized analgesia in cats after exposure to a war gas $(CH_3)_2SO_4$.

By JOHN AUER.

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Procedure.—Cats were subjected to the action of dimethyl sulphate fumes in a concentration of 4.5 to 10,000 of air for one hour. The dimethyl sulphate, which is a liquid at ordinary temperatures with a specific gravity of 1.32 and a boiling point of 188° C., was vaporized by an electric hot plate in the gas chamber. An electric fan in the gas chamber kept the available fumes mixed with the air. The temperature of the gas chamber was maintained between 25–30° C.

With this strength of gas the cats usually succumbed in 30–60 hours.

In cats which are gassed as described above a strong generalized analgesia is observed within a few hours after exposure to the dimethyl sulphate fumes, and reaches a high degree within twenty-four hours. If the animal survives, the analgesia may still be well marked six months afterwards.

In such animals severe operations may be performed without any anæsthetic and without eliciting any or only slight indications of pain. Thus, for example, the femoral artery may be dissected free, tracheotomy performed, the vagosympathetic trunk exposed in the neck, the tibialis anticus muscle dissected free, the peritoneum opened and the parietal walls rubbed by an inserted finger, or gentle traction exerted upon the gut, without causing any or at most only slight signs of pain. Severe compression of the tail, toe pads, nasal septum, lip, ears, cause no sign of pain, though the tail is twitched aside, the foot withdrawn, the head turned away or the ears flattened against the head when the pressure stimulus is stopped.

The loss of pain perception was, however, not complete in any animal: blunt dissection of a mixed nerve which stretched it or electrical stimulation of the sensory nerve, always caused more or less restlessness of the animal, but never to the degree which is obtained by the same manipulation in a partially anæsthetized cat.

There is therefore not only an outspoken depression of the peripheral apparatus for pain perception, but the higher centers show also a definite though less marked involvement.

It must be emphasized that the analgesia described above does not depend upon a low general state. There may be a profound general analgesia while the animal is in an excellent general condition; thus in an instance with most pronounced analgesia the blood-pressure was 118 mm., pulse 150, respiration 35 per minute; the tongue and mucous membranes showed a good red color, and the rectal temperature was 37.3° C.

While investigating this analgesic property of dimethyl sulphate gas, Naiding published observations in the *Russky Vrach* (May 6, 13, 20, 1917, XVI) recording the production of local or generalized skin analgesias in soldiers gassed with chlorine and phosgene. Naiding appears to have tested skin sensibility only and does not mention that severe cutting operations can be carried out without pain. In experiments which are at present being carried out with another exceedingly toxic war gas the same remarkable analgesia is produced. Analgesia may thus be produced by at least three widely different war gases and may perhaps be a property of most gases usable for military purposes.

This property, common at least to some war gases, could be utilized practically in gassed soldiers who are also wounded and require surgical intervention. It is very likely that they would need little if any anæsthetic. The gassed soldiers would thus be spared another danger and a valuable drug would not be needlessly expended.

173 (1351)

Localized pulmonary edema in cats after the inhalation of a war gas $(CH_3)_2SO_4$.

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In a number of cats which died or were killed 27–50 hours after gassing with $(CH_3)_2SO_4$, as described in the previous note, a localized pulmonary edema was observed on autopsy. The edema rarely involved the whole lung, but only a certain lobe or portions of a lobe showed a striking degree of pulmonary edema. The lobe involved was most frequently an upper or a middle lobe, but the lower lobes were by no means exempt. The best example of edema of a portion of a lobe was noted in the right middle lobe, where a section near the hilus showed extreme pulmonary edema, while the rest of the lobe was only moderately edematous. It was by no means infrequent to find one lobe fairly saturated with fluid while the rest of the entire lung tissue was practically free from fluid. Hemorrhages and pulmonary congestion, it should be noted, are not prominent features of the autopsy picture of the lungs after gassing with $(CH_3)_2SO_4$.

The causation of this localized pulmonary edema obviously must be due to some mechanism which affects the lung chiefly at the site involved; it cannot involve the whole lung to the same degree, for then the whole lung would have to be equally edematous. This locally acting mechanism is apparently the combination of a partial or complete stenosis of a bronchus or bronchiole with inspiratory dyspnea. These conditions are realized in cats gassed with dimethyl sulphate, for a marked inflammation of the respiratory passages with pseudo-diphtheritic membrane formation