The effect of DL-amphetamine, its D- and L-isomers, and of D-lysergic acid diethylamide (Stoll, 1947) on the electrical activity of the brain has been studied in the conscious unrestrained animal, and in acute experiment. Large doses of DL-amphetamine (3-5 mg/kg by mouth) produced rhythms not unlike those seen in the normal alert animal, i.e. low amplitude, diffuse, fast (15-30 c/s) activity in all regions. There was also a corresponding change in behaviour, the animal becoming more attentive, and, in some instances, excited. The cortical response to rhythmic photic stimulation, recorded over the visual area, was increased in amplitude at all frequencies between 2 and 25 per sec.

The effects of D-lysergic acid diethylamide (15-25 μg/kg by mouth) on electrical activity and behaviour were similar to those of DL-amphetamine, but no change in the response to photic stimulation could be observed with this drug. The effects of barbiturate anaesthesia (pentobarbitone 30 mg/kg) on the electrical activity of the brain remained unaffected by amphetamine when recorded at the cortical level. There was, however, some increase in the response to photic stimulation at the level of the lateral geniculate body. Large doses of D-lysergic acid diethylamide (50-100 μg/kg) completely abolished the electrical activity characteristic of moderate barbiturate anaesthesia, though leaving the depth of anaesthesia apparently unaffected.

The characteristic waxing and waning activity seen in the corticogram of the brain sectioned in situ at the level of the 1st cervical vertebra (Bremer, 1938) was abolished by intravenous amphetamine in doses of 1.5-3 mg/kg. This activity was restored by section at midbrain level in the same preparation, and remained unaffected by further injections of amphetamine. D-Lysergic acid diethylamide in doses of up to 100 μg/kg had no effect on the electrical activity of either of these acute preparations.

The effects of amphetamine and D-lysergic acid diethylamide on the corticogram thus differ from atropine, L-hyoscyamine and physostigmine in their dependence upon mesencephalic or spinal connexions. Again, there is better correlation between electrical activity and behaviour in the case of amphetamine and D-lysergic acid diethylamide than there is with atropine, L-hyoscyamine and physostigmine. Amphetamine may act on receptors.
The differences between the effects of D-lysergic acid diethylamide and amphetamine, outweigh any common features shared by these two drugs, and point to probable differences in their mode of action.

REFERENCES