analgesic response to morphine injected before the 15th dose of reserpine and abolished the analgesic response when the narcotic was tested 4 hr after that dose of the tranquillizer.

The increase produced by morphine (10 mg/kg, i.p.) in the reaction time to heat stimulation of the mouse paw (hot plate test, 58·0° ± 0·5°) was abolished 4 hr after reserpine (1 mg/kg, i.p.). The analgesic effect of morphine partially returned over a 144 hr period following reserpine treatment. On the other hand, the pretreatment with two sucessive doses of α-methyltyrosine (each of 100 mg/kg, i.p.) given 8 and 4 hr respectively before the injection of morphine nearly abolished the analgesic effect of the narcotic, measured by the hot plate test in the mouse (Fig. 1).

These results support the view that the analgesic action of morphine is mediated though liberation of brain catecholamines.

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A new nerve muscle preparation: the obturator nerve-anterior gracilis preparation of the rat

SIR,—It is well known that the rat phrenic nerve-diaphragm preparation is insensitive to certain muscle relaxant drugs (Paton & Zaimis, 1952). An alternative and possibly more sensitive preparation appears to be the obturator nerve-anterior gracilis preparation of the rat. This muscle is 1·0 mm thick (Quilliam, 1955), or about twice the thickness of the diaphragm. A good diagram of the rat anterior gracilis and obturator nerve is given by Quilliam (1955). The anterior gracilis is a strap-like muscle which arises from the pubis and is inserted into the upper end of the tibia. It is exposed by removing the skin from the thigh and removing the connective tissue. The muscle can be identified easily because the obturator nerve enters its upper border and then divides into two parallel branches which run longitudinally down the muscle towards its insertion. The obturator nerve is exposed by cutting through the pectineus muscle and is followed up to the obturator foramen. At this point the nerve can be easily sectioned and carefully separated from the underlying muscle. The origin of the anterior gracilis is exposed by removal of the pectineus muscle. The bony origin is then cut free from the pelvis with bone cutting forceps and the muscle separated from adjacent muscles. In a similar manner the insertion is separated from the rest of the tibia. The muscle and nerve are then free and can be set up in a similar manner to the phrenic nerve-diaphragm in Krebs solution, oxygenated with oxygen 95% and carbon dioxide 5% at 37°.

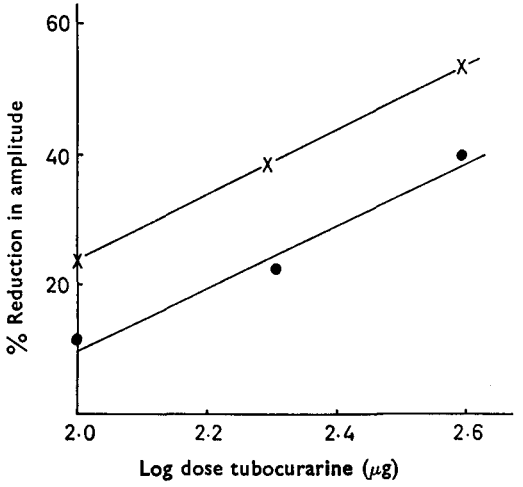

FIG. 1. Semi-log dose response curves showing difference in sensitivities to tubocurarine on the rat obturator nerve-anterior gracilis, ×——×, and the rat phrenic nerve-diaphragm, ●——●, preparations. Each point on the curves represents the mean of two values. In this experiment the range was too small to be shown. Both preparations were set up in the same 100 ml bath containing Krebs solution, gassed with oxygen (95%) and carbon dioxide (5%) at 37°. Each nerve was stimulated by supramaximal square wave pulses at a frequency of 12 min. Contractions were recorded using spring loaded levers writing on a smoked drum. The gracilis contractions were recorded above those of the diaphragm. In this experiment normal contractions were recorded for 90 sec, after which tubocurarine was added to the bath and recordings taken for a further 90 sec. Between responses the bath was washed out at 3 min intervals for 30 min.

The obturator nerve-anterior gracilis and phrenic nerve-diaphragm preparations were compared side-by-side in the same 100 ml bath. Each nerve was stimulated by supra-maximal square wave stimuli, having a pulse width of 0·5 msec, at a rate of 12/min from two different stimulators. Recordings were made on the same smoked drum using spring-loaded levers, the contractions of the gracilis being recorded above those of the diaphragm. Contractions were recorded for 60 to 90 sec, being constant within a single experiment, both before and after adding a neuromuscular blocking agent. After each response, the bath was washed out at 3 min intervals for 30 min.

In each of nine experiments, the obturator nerve-anterior gracilis preparation was consistantly more sensitive than the phrenic nerve-diaphragm preparation to tubocurarine (See Fig. 1). Similar results have been found with gallamine and with suxamethonium.

From these results, it would appear that a nonrespiratory muscle in the rat is more sensitive than a respiratory muscle to both kinds of neuromuscular blocking agent. This differs from the view of Paton & Zaimis (1952).

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