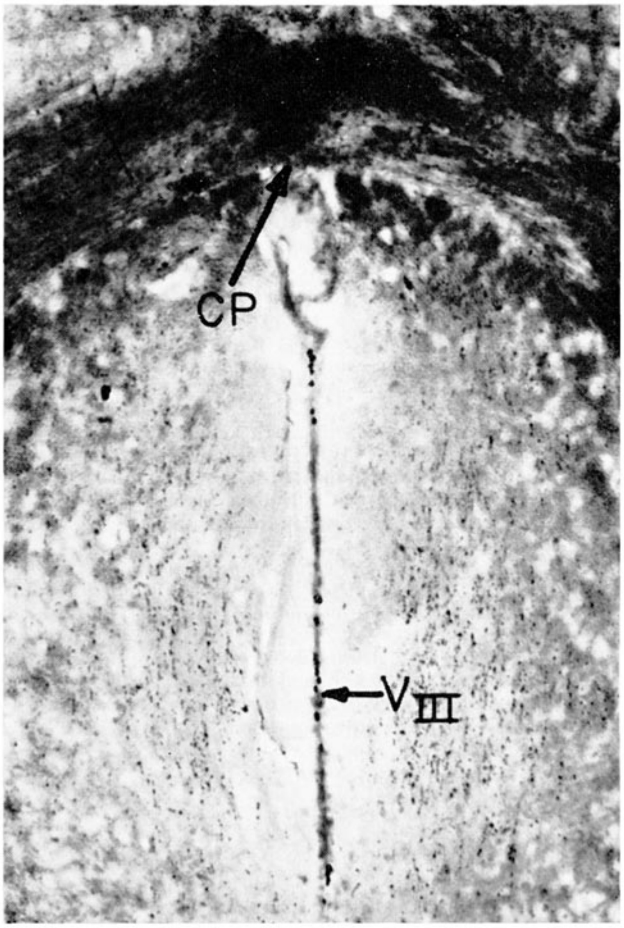

Terminal degeneration in central gray in mesencephalon at the level of the superior colliculus. V_{III}, third ventricle; CP, posterior commissure.

15 goldthioglucose-injected mice. The other 2 injected mice as well as the control mice showed no brain lesions. The pathway was shown to originate in the periventricular system, course dorsally and descend to terminate in the central gray region of the mesencephalon at the level of the superior colliculus. Terminal degeneration of the bundle of Schütz is illustrated in the Figure. No degeneration was shown below the level of the superior colliculus.

Thus, it appears that the bundle of Schütz like the fibers connecting VMA to LHA originate in neurons which are part of the glucoreceptive system as evidenced by the action of GTG[13].

Résumé. Les lésions provoquées chez des souris par une injection d'aurothioglucose dans la région ventromédiale de l'hypothalame sont suivies de la dégénérescence du fasciculus dorsalis longitudinalis (faisceau de Schütz). Cette observation indique que l'origine de cette structure efférente est glucoréceptive et fait partie du système glucorécepteur qui contrôle la satiété.

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Hemodynamic Patterns During Fighting Behaviour in the Cat[1]

It is widely held that emotion results in a characteristic hemodynamic pattern consisting of increased arterial pressure, increased heart rate, augmented cardiac output and increased total peripheral resistance due to sympathetically mediated vasoconstriction in the visceral and cutaneous beds. This vasoconstriction, however, is thought to be associated with selective vasodilatation in muscle blood vessels, brought about through specialized sympathetic fibres which can be blocked by atropine[2].

Most of this information has not been derived from naturally behaving animals, but from experiments in which the so-called hypothalamic defence area was electrically stimulated in anaesthetized cats[2,3]. These investigations obviously suffer from all limitations inherent in electrical stimulation of the brain and use of anaesthesia. Data obtained in unanaesthetized animals are restricted to the demonstration of an increased muscle blood flow during pseudoaffective reactions in high decerebrate cats[4] and during simple alerting in intact conscious cats[5]. Investigation in man has seldom gone beyond tests such as a difficult mental arithmetic task[6], or has been performed with too limited or unreliable hemodynamic techniques[7,8].

The experiments, the preliminary results of which we are going to report, have been planned to obtain a faithful picture of hemodynamic patterns in unanaesthetized, unrestrained animals during a definite kind of emotional behaviour. The fighting behaviour of the cat was selected as particularly suitable. The experimental set-up consisted of a cage subdivided into 2 compartments by a movable opaque screen. In a compartment a cat was placed having an electrode chronically implanted in the mesencephalic grey, so that electrical stimulation through this electrode invariably elicited attack behaviour. This cat was only used as a stimulus for evoking natural fighting behaviour in another cat, the subject of the experiment, which was placed in the other compartment of the cage. The subject had previously been selected because of its constant responding with hissing and striking whenever attacked by the electrically stimulated animal. Cardiovascular reactions were repeatedly recorded in 6 subjects while fighting against the electrically stimulated attacking cat. About a week before recording, they were implanted with electromagnetic flow-probes (Statham) around the ascending aorta, the superior mesenteric artery, and an external iliac artery. Cardiac output, mesenteric blood flow, and blood flow through a hind limb were continuously computed from the instantaneous flow curves by integrating amplifiers automatically reset at 2-sec intervals. Blood pressure was measured through an implanted arterial cannula and a strain-gage transducer, and heart rate by cardiotachography. The electromyogram of the neck, and that of the hind limb, the blood flow of which was measured, were also recorded. The time during which the dividing screen was raised and the strikes given with the forelimb by the recorded cat were also signalled on the 12-channel Grass P7 polygraph by suitable markers.

The cardiovascular changes were found to be dependent upon the posture and the amount of muscle activity of the cat during fighting. Therefore, 2 types of fighting were distinguished: in 1, the animal lay on its side, during both baseline and fighting, hissed and struck with the forelimbs, and did not support itself with the hindlimbs or use them during fighting. This type, in which the hind limb EMG showed minimal change in muscle activity will be designated non-supportive fighting. In the other type the cat supported itself on its hind limbs during the baseline period and used them for balance and support during fighting; here the EMG showed considerable increase in muscle activity. This type will be termed supportive fighting.

The cardiovascular changes characteristic of the 2 types of fighting showed consistent patterns in all animals tested and were found statistically significant when analyzed with a *t*-test of differences. As a typical example the mean values of 6 episodes of both types of fighting from the same cat are presented in Figures 1 and 2. The episodes of Figure 1 were carried out with the hind legs in a non-supporting posture. In the first 2-sec interval between raising the partition and beginning of the fighting response of the cat, there was a slight decrease in mean arterial pressure, in heart rate, in cardiac output, in mesenteric and in iliac blood flow. This is the same hemc-

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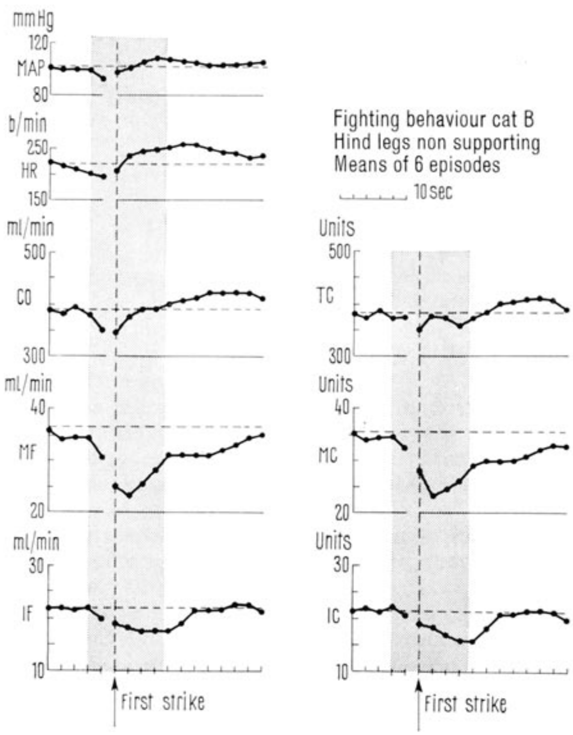

Fig. 1

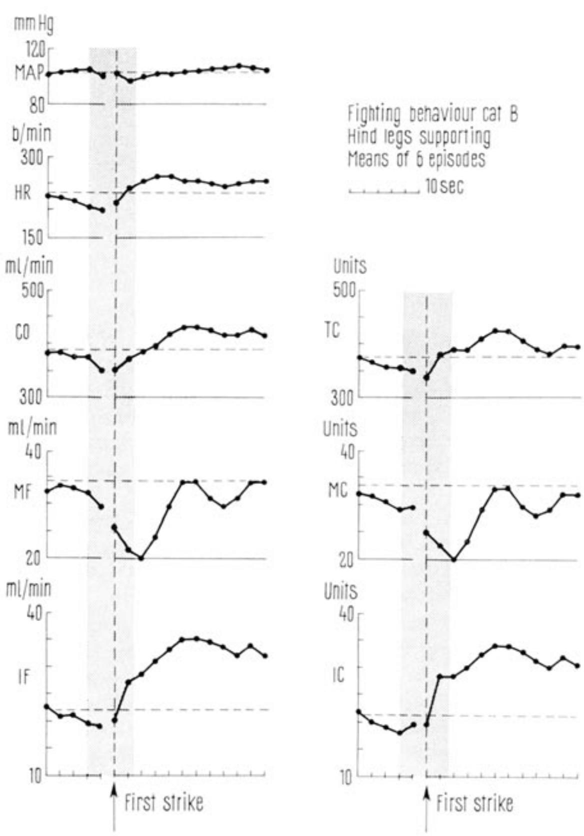

Fig. 2

Figs. 1 and 2. Each filled circle represents the mean of 2-sec measurements performed during 6 fighting episodes. Shaded area is time during which partition was opened, while vertical line indicates first strike of the attacked cat (i.e. beginning of fighting). Interruption of line joining filled circles is due to the variable time between opening of partition and beginning of fighting in the different episodes. Horizontal broken line indicates baseline measurements when the cat was quiet prior to the trials. MAP, mean arterial pressure; HR, heart rate; CO, cardiac output; MF, superior mesenteric flow; IF, external iliac flow; TC, total peripheral conductance; MC, superior mesenteric conductance; IC, external iliac conductance.

dynamic pattern that was observed when opening of the partition was not followed by attack, and therefore by a fighting response. Whenever fighting occurred, however, the decrease in heart rate and cardiac output changed to an increase, which was more delayed as far as cardiac output was concerned. Mesenteric and iliac flows showed a more marked decrease. Due to the rather small change in arterial pressure, the ratio blood flow over mean pressure, that is vascular conductance, could be used as an index of vascular diameter. During non-supportive fighting there was little change in total vascular conductance. A marked decrease in mesenteric and iliac conductances indicates vasoconstriction in both beds. Iliac vasoconstriction did not represent simply a vasoconstriction of cutaneous vessels, but probably of muscle vessels as well, since it was also observed when increased pressure within a plethysmograph cuff eliminated all blood flow to the paw, i.e. that portion of the hind limb which receives the major part of the neurally regulated cutaneous limb flow[9].

When the hind legs supported the body, and participated in fighting (Figure 2), the initial vasoconstriction in the iliac bed was quickly superseded by strong dilatation, while mesenteric vasoconstriction was still very marked. Total vascular conductance now showed a stronger trend toward overall vasodilatation, and mean arterial pressure was substantially unchanged, if not slightly decreased.

The data obtained during natural fighting behaviour in the intact cat have confirmed only in part what had been nferred by previous authors in much more artificial experimental situations. As a matter of fact, in absence of movement we have found iliac vasoconstriction, instead of the expected neural cholinergic vasodilatation. Muscle vasodilatation has been observed only when there was muscle activity, suggesting a local metabolite factor as the main operating vasodilator mechanism in the leg muscles during fighting.

Riassunto. Durante il comportamento di lotta del gatto libero non anestetizzato si osserva tachicardia e aumento della gettata cardiaca; la pressione arteriosa e la conduttanza periferica totale variano relativamente poco. Si ha una marcata vasocostrizione mesenterica, mentre il letto iliaco subisce modificazioni di senso opposto a seconda dell'attività motoria dell'arto posteriore. In assenza di movimento si ha una vasocostrizione, che interessa non solo il letto cutaneo ma anche quello muscolare; questa vasocostrizione viene invece soffocata da una cospicua vasodilatazione, d'evidente origine metabolica, ogni qual volta vi sia attività muscolare locale.

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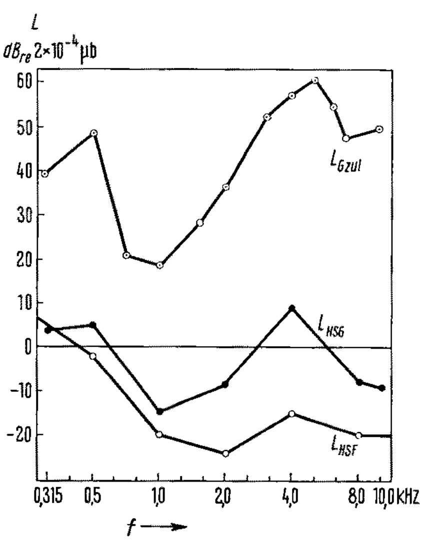
Zulässiger Schalldruck bei binauraler Reizung ohne überschwelliges interaurales Übersprechen (Katze)

In früheren Untersuchungen[1] wurde der Frequenzgang der interauralen Übersprechdämmung an der Katze angegeben. Für die Bestimmung des maximal an einem Ohr zulässigen Schalldruckes, der das andere Ohr durch Übersprechen nicht überschwellig erregt, ist darüber hinaus noch die Kenntnis der Hörschwellenkurve erforderlich. Eine Hörschwellenkurve für die Katze wurde von Elliot et al.[2] im Verhaltensversuch ermittelt. Sie wurde in einem von einem einzelnen Lautsprecher erzeugten Schallfeld gemessen, das am besten durch ein Freifeld angenähert werden kann.

Versuche mit unabhängiger Reizung beider Ohren erfordern jedoch eine Darbietung des Reizes über Kopfhörer, wobei die Schalldruckkontrolle im Gehörgang erfolgen muss. Daher sind die Hörschwellenkurven von Elliot et al.[2] nicht ohne weiteres zu verwenden, der Unterschied zwischen dem Schalldruckpegel im Gehörgang und im Freifeld muss berücksichtigt werden. Messwerte dieses Unterschiedes wurden bereits von Wiener et al.[3] ermittelt, allerdings für frontalen Einfall des Schalles. Da sich in den Versuchen von Elliot et al.[2] die Tiere jedoch frei bewegen konnten, kann man annehmen, dass die Werte für den Einfallswinkel gelten, bei denen der grösste Gehörgangspegel entsteht. Dieser Einfallswinkel und der dabei auftretende maximale Schalldruckpegel L_{Gmax} wurden im Bereich von 200 Hz – 16 kHz in Terzschritten bestimmt.

Als Messraum diente ein reflexionsarmer Raum. Der Gehörgangspegel L_G wurde direkt am Trommelfell einer narkotisierten Katze über eine ca. 1 mm starke Sonde und ein Kondensatormikrophon registriert. Das Tier wurde dabei auf einem Drehtisch um seine vertikale



Hörschwellenpegel L_{HSF} im Freifeld nach Elliot et al.[2], Hörschwellenpegel im Gehörgang L_{HSG} und zulässiger Gehörgangspegel L_{Gzul} für nicht überschwelliges interaurales Übersprechen.

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