Means of surface tension (in dynes/100 cm) of the cell types of differentiating CNS of the chick

Parts of CNS	Days 6	8	10	12	14	16	18	20	23	25	Mean
Fore-brain	59.9973	60.0618	61.3503	55.9748	58.1292	58.4760	56.4060	47.8957	44.3364	44.5629	54.7190
Mid-brain	60.9498	60.7350	58.0310	57.1399	55.2452	55.0652	53.6894	48.2660	43.1723	41.4299	53.3724
Hind-brain	60.1883	60.7071	49.9640	48.8573	47.1043	46.1492	46.1342	45.7957	43.7233	41.2209	48.7844
Spinal cord	58.6016	59.6205	54.2214	49.8238	48.8318	45.0713	44.6550	42.2970	42.0962	39.4816	48.4700
Mean	59.9345	60.2811	55.8916	52.9489	52.3276	51.1904	50.2211	46.0636	43.3321	41.6738	51.3364

For comparison of parts means, c.d. at 5%, 1.4808.

the progress of differentiation the value of surface tension becomes decreased.

Though apparently the various parts of the differentiating CNS of chick do not show identical relationships so far as the surface tension of cell types are concerned, it may be observed from the Table that the values of the surface tension of the cell types of the fore- and mid-brain and those of the hind-brain and the spinal cord are very much statistically similar, as those values are always less than the c.d. values at 5% level. Thus, while the values for the fore- and mid-brain are quite different from those of the hind-brain and the spinal cord, as evident from the comparison of parts at 5% level, the values of the first two parts of the central nervous system, viz. fore- and mid-brain, are similar while the values of the hind-brain and those of the spinal cord are also alike. This phenomenon fits well with the fact that the anterior part of the primitive streak gives rise to the fore-brain while the posterior part of the streak gives rise to the spinal cord; mid-brain comes from the anterior half of the middle piece of the primitive streak while the hind-brain is the outcome from the posterior portion of the middle piece. Thus, during individuation, the differentiating cells distributed in the anteroposterior direction of the primitive streak maintain the original pattern of the gradient property.

The estimated regression lines for the data were calculated. The results indicated significant linear decrease of the surface tension as a function of the increasing age of the embryo. Computation of the correlation coefficient (r) of the data showed a perfect negative correlation in each case. Finally, the significance of r was estimated by t-test. The apparent negative correlation was found to be real ($p < 0.01$) and was very strong since 80% of the total variance is due to regression.

Zusammenfassung. Es wird gezeigt, dass die Oberflächenspannung von Neuroblasten sich mit zunehmender Differenzierung ändert. Es kann ein kraniokaudaler Entwicklungsgradient nachgewiesen werden.

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Fever in the Monkey Produced by the Direct Action of Pyrogen on the Hypothalamus[1]

The subhuman primate is generally less responsive than the human to bacterial pyrogens administered by the systemic route[2]. For example, the endotoxin of *Salmonella typhosa* or *Escherichia coli* injected i.v. in doses as high as 10–12 mg per kg produces little if any febrile response in the monkey unless the animal is restrained and covered with a blanket[3].

In the rabbit and cat, certain regions of the brain-stem are known to be sensitive to the presence of a bacterial pyrogen[4,5]. In fact, the local injection of an endotoxin or leukocytic pyrogen evokes a pyrexic response, the magnitude and latency of which depends upon the proximity of the injection to the anterior hypothalamic, pre-optic region. In the present experiments, we have found that different endotoxins injected locally in the rostral hypothalamus of the monkey are able to produce a dose-dependent fever, vasoconstriction and shivering.

Materials and methods. Male rhesus monkeys, weighing 5.0–6.5 kg were acclimated to special restraining chairs and maintained at a room temperature of 23–25 °C. Under rigid aseptic precautions, an array of microinjection cannulae guides was implanted stereotaxically in each monkey, according to surgical procedures described previously[6]. Seven to 10 days were allowed for recovery from surgery. During an experiment, body temperature was monitored continuously either from a thermistor bead implanted against the sagittal sinus, a probe inserted within the colon, or both.

A control solution or an endotoxin was injected into brain tissue in a volume of 0.8–1.2 µl at a depth of 6–10 mm beneath the cannula guide tube. *Shigella dysenteriae* (type SH 16), *Salmonella typhosa* (type 643) and *Escherichia coli* (type W3110) were grown to a concentration of $2–5 \times 10^9$ organisms per ml and then killed by toluene bubbling. The cells were then separated by centrifugation, washed and re-suspended in an equivalent volume of 0.9% pyrogen-free saline. Suspensions for micro-injection of the cell bodies were prepared in pyrogen-free 0.9% saline in dilutions ranging from 1:2 to 1:1000.

Results and discussion. When an endotoxin was microinjected into the anterior hypothalamus or pre-optic area, a long-lasting fever was produced which was accompanied by intermittent shivering, piloerection and a drawing up of the limbs characteristic of huddling. The Figure illustrates the pyrexic responses of three

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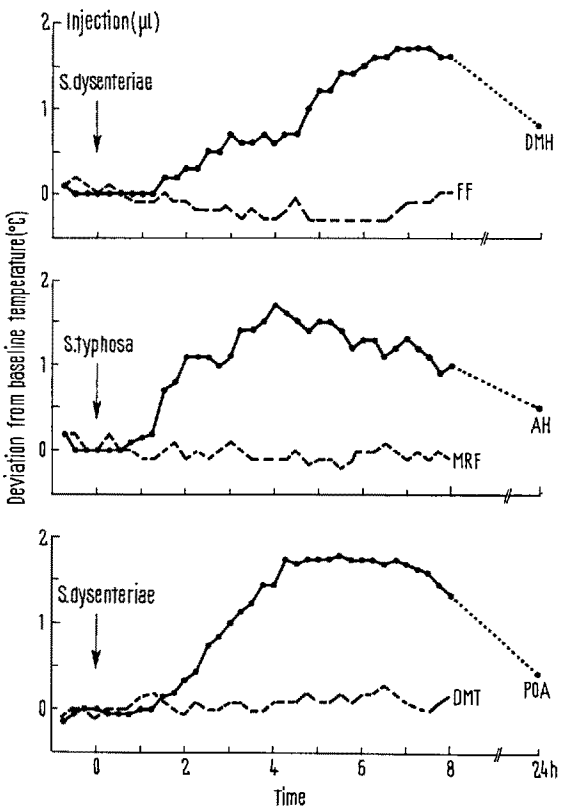
unanesthetized monkeys following micro-injection of *Shigella dysenteriae* or *Salmonella typhosa* into specific sites within the hypothalamus and other brain-stem structures. *Shigella* given in the dorsomedial hypothalamus (DMH) caused a prolonged fever after a latency of a little over an hour. However, when *Salmonella* was micro-injected directly into the anterior hypothalamus (AH), the latency of the febrile response was somewhat shorter and the rate of the rise in temperature appeared to be more rapid. *Shigella dysenteriae* given in the pre-optic area (POA) produced a fever of similar latency and slope.



Changes in colonic temperature of 3 unanesthetized rhesus monkeys in response to injections at zero hour of 1.2 µl of bacterial pyrogen in a 1:2 dilution. Top: *S. dysenteriae* was injected into the dorsomedial nucleus of the hypothalamus (DMH) and the fields of Forel (FF). Middle: *S. typhosa* micro-injected in the anterior hypothalamus (AH) and mesencephalic reticular formation (MRF). Bottom: *S. dysenteriae* micro-injected into the pre-optic area (POA) and dorsomedial nucleus of the thalamus (DMT).

If these endotoxins were micro-injected in anatomical sites other than the rostral portion of the hypothalamus, there were no significant changes in the temperature of the monkeys. These insensitive regions include the fields of Forel (FF), the mesencephalic reticular formation (MRF) and the dorsomedial thalamus (DMT). Moreover, tachyphylaxis to repeated micro-injections of any of the endotoxins was not observed. *Escherichia coli* was micro-injected 16 times into the anterior hypothalamus of 1 monkey at intervals of 48–96 h over a period of 34 days. The features of the pyrexic response on the last day were virtually identical to those of the first.

These results show that cells within the rostral hypothalamus of the monkey are sensitive to at least 3 different types of gram-negative bacteria. In the rhesus monkey, an unknown protective mechanism apparently exists within blood tissue which prevents pyrexia from developing in response to the bacteria present systemically. When 0.8 ml of undiluted *Salmonella typhosa* in a dose of 10^9 organisms per ml was given in our monkeys intravenously, the temperature varied little. Yet a mechanism does exist in the hypothalamus of this species for mediating a fever due to a bacteria, since as little as 1000 organisms injected into the anterior hypothalamus evoked pyrexia. Although the cellular mechanisms which trigger and sustain the fever with all of its *sequelae* are not at present understood, it would appear that a pyrogen may act directly either on the cell membranes of the hypothalamic neurons or indirectly by releasing a neurotransmitter substance[8].

Zusammenfassung. Eine dosisabhängige Steigerung der Körpertemperatur wurde erzielt, wenn Pyrogen-Substanzen aus verschiedenen gram-negativen Bakterienstämmen stereotaktisch in den Hypothalamus nicht narkotisierter Affen injiziert wurden.

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Pheromone and Terpene Attraction in the Bark Beetle *Ips typographus* L.

We report the first evidence that *Ips typographus* L. (Coleoptera: Scolytidae) is strongly attracted to both certain terpenes and a pheromone produced by the male beetle. *Ips typographus* is the most destructive bark beetle in the extensive Norway spruce (*Picea excelsa* Link.) forests in Europe and Asia. The attraction seen in our field studies is similar to the olfactory mechanism which has been intensively studied in several North American scolytids, certain of which are already being experimentally manipulated with terpenes and synthesized pheromones[1,2]. Therefore, further study is indicated of possible control of *I. typographus* by such means.

Earlier, male-produced pheromones were found in destructive *Ips* spp. on pines in North America[3] and in *I. acuminatus* Gyll. on pine in Norway[4]. Merker[5], Chararas[6], Adlung[7] et al. have studied effects of host volatiles on *I. typographus* without relation to a pheromone.

The present study was made in 100-year-old spruce forests near Třeboň, Bohemia and Hronec, Slovakia, in May and June 1970. We separated and introduced mature males and females to sections of spruce logs 70 cm long placed in plastic-screened cages, 50 × 50 × 80 cm. As controls we used naturally invaded log sections 2 days after attack, and uninvaded logs. The cages were