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[3] The term 'tryptophols' will be used to refer to 5-hydroxytryptophol, 5-methoxytryptophol as well as tryptophol.
[4] Rectal temperatures were recorded by the method of BROWN; A. M. BROWN, J. Pharm. Pharmac. *16*, 701 (1964). Room temperature varied between 23–26 °C.
[5] Propylene glycol and water, in a 1:1 mixture was used as the vehicle.
[6] The pH of the 5-HIAA injections were neutral at the 250 and 500 mg/kg dose and slightly acid (pH of 6) at the 1000 mg/kg dose.
[7] J. KARJA, N. T. KARKI and E. TALA, Acta pharmac. tox. *18*, 255 (1961).
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[9] A. FELDSTEIN and O. WILLIAMSON, Br. J. Pharmac. *34*, 38 (1968).
[10] A separate 2 factor (dose and time) repeated-measure analysis of variance was performed on the 12 post-injection rectal temperature measures for each agent. B. J. WINER, *Statistical Principles in Experimental Design* (McGraw-Hill, New York 1962), p. 298.
[11] The 'tryptophols' dissolved in sesame oil also produced significant drops in body temperature. Sesame oil, itself, did not effect body temperature.
[12] The data were analyzed, in each case, by a three-way repeated-measure analysis of variance (B. J. WINER, *Statistical Principles in Experimental Design* (McGraw-Hill, New York 1962), p. 298). The rectal temperature measures just prior to and 20 min following administration of 5-HTP were compared and revealed that pretreatment with the MAO inhibitor did not differentially affect the initial response of the animals to 5-HTP. There was also no evidence in the data that the maximum rectal temperature following 5-HTP was significantly greater than the initial predrug rectal temperature. Some of the MAO-inhibited animals, however, experienced hyperthermia (particularly at the 200 mg/kg dose of 5-HTP) but variability existed at each dose level. An overall analysis of variance, which included all the data, revealed a significant triple interaction ($P < 0.01$); that is, rectal temperature varied as a function of pretreatment, dose of 5-HTP and time since injection.
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reversible reaction or to 5-HIAA in an essentially irreversible reaction[9]. Figure 1 shows that 5-hydroxytryptophol or its analogues, tryptophol and 5-methoxytryptophol, produced a significant ($P < 0.01$) dose and time dependent decrease in body temperature, but that 5-HIAA had no effect on body temperature[10,11]. Figure 2 shows that pretreatement with an MAO inhibitor prevented the 5-HTP-induced hypothermia, suggesting that the 'tryptophol' metabolite rather then 5-HT itself was the active hypothermic agent. The small initial drop in rectal temperature (Figure 2) which occurred immediately after administration of 5-HTP to the MAO-inhibited animals[12] could be accounted for by depletion of norepinephrine by 5-HTP[13]. The subsequent increase in body temperature, however, did not lead to a significant hyperthermia[12].

Two issues are raised when large doses of drugs are given i.p.; first whether the observed effects are of central or peripheral origin, and second whether the observed effects are pharmacological or physiological in nature. The available evidence suggests that the 'tryptophols' produce CNS effects[14]. The doses of the 'tryptophols' were specifically selected from a range that produced a dose-dependent sleep response[15]. The 'tryptophols', as found for 5-methoxytryptophol[16], may not readily cross the blood-brain barrier, therefore, requiring large doses. They are also known to be rapidly metabolized by the liver[17], although the enzymes required to metabolize the 'tryptophols' are found in various areas of the brain[14]. Together, these data make tenable the working hypothesis, that the observed effects represent changes in a centrally mediated physiological regulatory process.

The formation of the 'tryptophols' from the aldehyde is a reversible process, and since 5-hydroxyindoleacetaldehyde has CNS effects[18], a possible role for the aldehyde-metabolites in the production of hypothermia must be evaluated. Irrespective of which metabolite is active, the results of the present experiments make imperative consideration of the metabolites in any 5-HT induced modification of body temperature, and raise doubts about 5-HT itself being the active agent[19].

Zusammenfassung. In Mäuseversuchen wurde gezeigt, dass nicht Serotonin, sondern zwei seiner Metaboliten (5-Hydroxytryptophol oder dessen Ausgangsstoff 5-Hydroxyindolacetaldehyd) die Hypothermie erzeugen.

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Kristalloide Einschlüsse im Karyoplasma von Spermatiden eines Myriapoden

Bei der Untersuchung der Spermiohistogenese von Spirostreptus spec. (Diplopoda, Myriapoda)[1] fielen langgestreckte osmiophile Körper im Karyoplasma auf, die eine sehr regelmässige Streifung besitzen (Figur).

Die Periode der Querstreifung beträgt zwischen 120–135 Å, die osmiophilen Streifen sind 75–85 Å breit, die hellen 40–50 Å. Sie entspricht einem regelmässigen Aufbau der Einschlüsse aus Lamellen. Die Einschlüsse sind meist langgestreckt, stabförmig und bis 10 µ lang bei einer Breite von 0,1 µ; es kommen aber auch gedrungene, 0.25 µ breite Körper vor. Bemerkenswert ist die Nachbarschaft zu einer filamentösen Struktur, die in derselben Richtung wie die Längsachse des kristalloiden Einschlusses verläuft (Figur, b).

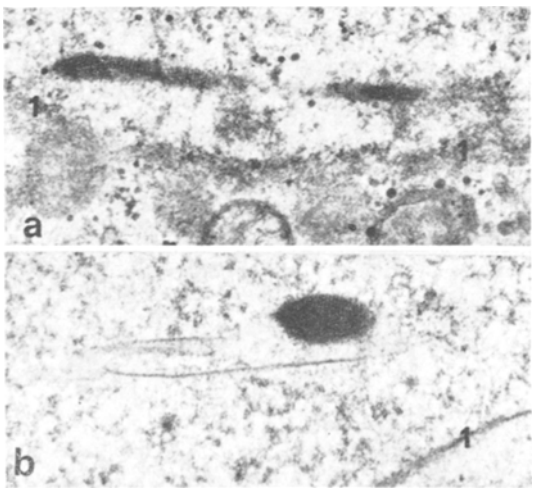
Der Körper tritt in einer bestimmten Phase der Spermiohistogenese auf, nämlich nachdem die Anlage des Akrosomkomplexes abgeschlossen ist und der Komplex nur noch an Grösse zunimmt, und bevor die Kernkondensation einsetzt (vergl.[1]). Im Kern konnte nie mehr als ein Einschluss gefunden werden, im Zytoplasma kommen vergleichbare Einschlüsse nicht vor.

[1] E. HORSTMANN und H. BREUCKER, Z. Zellforsch. *99*, 153 (1969).

Von allen kristallartigen Einschlüssen, die ich in der Literatur abgebildet finde, ähnelt die Struktur noch am ehesten dem Externum der Einschlüsse, die LANGE und VON BREHM[2] in Epithelzellen der Glandula parathyreoidea von *Rana temporaria* abgebildet und beschrieben haben. Dort ist die Periodizität allerdings nur 70 Å. Die Autoren haben in der Nachbarschaft des kristalloiden Einschlusses ebenfalls eine fibrilläre Struktur gefunden und folgern, dass die beiden Strukturen in irgendeiner Beziehung zueinander stehen.

Filamentöse beziehungsweise tubulöse gestreckte Bündel im Karyoplasma sind in den letzten Jahren mehrfach beschrieben worden. Man hat sie in Nervenzellen[3–5] in der Adenohypophyse und im Nebenhodenepithel[6], in Oozyten[7] sowie in den β-Zellen von Pankreasinseln[8] gefunden. Für alle diese Fundorte ist es charakteristisch, dass sie nur bei bestimmten Arten vorkommen, bei nahe verwandten Formen aber fehlen. Aus den bisherigen Befunden ergeben sich keine Anzeichen eines degenerativen Geschehens. Die unsystematische Streuung der Fundorte solcher Strukturen lässt die Annahme zu, dass diese Strukturen Zeichen einer Änderung des Kernstoffwechsels sind, die zu keiner spezifischen Leistung der einzelnen Zellarten in Beziehung stehen.

Da die hier beschriebenen kristalloiden Einschlüsse mit den filamentösen Bündeln zusammen vorkommen, liegt die Vermutung nahe, dass auch sie der Ausdruck von besonderen Vorgängen im Kernstoffwechsel sind.



(a) Langgestreckter Einschluss im Karyoplasma einer Spermatide, 1,1 tangential getroffene Kernmembran, darunter Mitochondrien. (b) Gedrungener Einschluss, darunter filamentöse Struktur, 1 Kernmembran. Fix.: Glutaraldehyd, OsO_4; Kontrastierung mit Bleihydroxyd. Vergrösserung 40000fach.

Summary. In the caryoplasm of the early spermatids of a Diplopode, there is a crystalloid inclusion which is accompanied by a linear bundle of filaments.

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The Effects of Non-Thermal Radio Frequency Radiation on Human Lymphocytes in vitro

The effects of radio waves on biological material have been reported to be of both a thermal[1–3] and a non-thermal[4–6] nature. The investigation of non-thermal effects has received relatively little enthusiasm since results have often been masked by thermal effects. Nevertheless, chromosomal aberrations[7], decreased enzymatic activity[8], and alteration of polarity ('pearl chain' phenomenon)[9] have reportedly been induced in lower life forms by radio wave radiation. The heating of an organism by means of radio waves (diathermy) is the result of a condition known as a 'lossy dielectric'[10]. Investigation of non-thermal effects of radio radiation on mammalian organisms has been lacking, presumably because of this condition. Tissue culture, however, provides a system whereby heating is avoided or minimized due to the singular nature of the cell type utilized. In addition, the human lymphocyte culture technique provides a high degree of standardization and reproducibility. It was thus felt that this technique would allow for assessment of only the non-thermal effects of radio radiation on human cells in vitro.

Materials and methods. Peripheral blood lymphocytes from 18 individuals (male and female of normal karyotype) were cultured with phytohemagglutinin according to a modification of the technique of MOORHEAD et al.[11]. 3 cultures were established in each experiment and designated control 1 (C_1), control 2 (C_2) and experimental (E). C_1 was placed unshielded in the incubator, C_2 was placed within a grounded shield (Faraday Shield) in the incubator and E was placed within a tuned coil (inductive radiation source) which was housed within another Faraday Shield in the incubator. All cultures were incubated at 37 °C. The temperature of the culture media was monitored manually.

Percentages of hypotonic spreads from control and experimental cultures which demonstrated broken chromosomes

Percentage of spreads showing Broken chromosomes			
Control	0.6%	Experimental	4.0%