after 90 days of irradiation. The same response in thyroid activity was produced in 60 days post-irradiation with 2.4 kR as evident by I^{131} uptake (Batch 3). The rate of reduction in thyroid activity was observed to be directly proportional to the increasing doses of X-rays. The thyroid activity in the specimens of batch 6 after exposure to 4.8 kR was depressed very quickly and registered an uptake of only about 4% of the total injected dose on 30th day post-treatment as compared to 15% uptake of sham-irradiated control. Radiation-induced damage in the thyroid gland histology was reflected by follicular atrophy, loss of epithelium and colloid and connective tissue fibrosis. There was no significant change in the thyroid follicles of the specimens of batch 2 when compared to controls till 90 days after irradiation. A slight follicular atrophy was observed after 120 days of treatment. Although the thyroidal radioiodine uptake was considerably depressed in batches 4, 5 and 6 within 30 days of treatment, significant damage in thyroid histology became apparent at about 60 days after irradiation. The appearance of histological damage in thyroid gland was slower than its radioiodine uptake response after X-irradiation. It seems that radioiodine uptake test for thyroid activity is more sensitive than histological response which has also been advocated by FONTAINE et al.[11]. The serum-PBI measurements were also done for the evaluation of thyroid activity but the result has been communicated elsewhere. The state of activity of thyroid gland as reflected by radioiodine uptake was also supported by serum-PBI test. These tests – thyroidal I^{131} uptake and serum-PBI for determination of thyroid activity – appear to be more sensitive, quick and reliable.

Further experiments in this line are currently in progress. X-irradiated specimens (frequency 2.4 to 5 kR) showed very little or no response to TSH administration. It appears that thyroid dysfunction induced by X-irradiation is primary and not the result of TSH deficiency. Probably X-rays basically interfere with biological activity of epithelial cells of thyroid gland and inactivate and or kill enzymes responsible for initiating the trapping of circulating iodine and synthesis of thyroid hormone, or cell permeability of the follicular cells is lost and thus they are unable to perform one of their primary tasks, i.e., to maintain 'Iodine pump' which provides the raw material 'iodine' required in thyroid hormone synthesis[12].

Zusammenfassung. Eine niedrige Dosis Röntgenstrahlen führt zu einer mässigen Steigerung der Radiojodaufnahme in der Schilddrüse von *Mystus vittatus*, während mit steigender Röntgendosis die Radiojodaufnahme gehemmt werden konnte.

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Induction of Obesity in Obese-Hyperglycaemic Mice on Normal Food Intake

It has been alleged that the pathogenesis of the syndrome of obesity and hyperglycaemia in the mouse differs from that of hypothalamic obesity. The basic difference is that in the latter, the regulation of food is deranged, resulting in hyperphagia and obesity (regulatory obesity), whereas in the obese hyperglycaemic mice (*obob*), hyperphagia is secondary to a primary metabolic defect (metabolic obesity)[1,2]. The search for this primary metabolic defect has been intensive, but as yet unsuccessful. STAUFFACHER et al.[3] suggested that the muscle tissue of *obob* is inherently insensitive to insulin and that this insensitivity could conceivably be causally related to the development of the syndrome. We confirmed the presence of insulin-insensitive muscle in *obob*, but concluded that this was secondary to obesity as it disappeared following reduction of body weight[4]. There is also evidence supporting the view that the adiposity of *obob* precedes the occurrence of hyperinsulinaemia, and hyperglycaemia[5].

Thus, it would appear that the *obob* can increase the mass of their adipose tissue in the absence of hyperglycaemia, hyperinsulinaemia, and insulin resistance. The hypothesis that they can also increase it in the absence of excessive food intake was tested in the following experiment: 5 entire litters consisting of the offspring of mice heterozygous for the mutant gene (*Obob*) were taken at weaning (21 ± 2 days). They were weighed, caged individually, and given Thomson's rat diet, in pellet form, for 2 days. Following this, they were given the same food but in powder form, and in amount slightly less (by 0.3 g) to the mean daily food intake of lean mice of the same age and sex. Uneaten food, if any, was measured daily and thus the daily food intake for each mouse was determined.

There were no visibly obese animals at the start of the experiment. However, by about the second month of age, 4 out of the 37 animals had the typical appearance of *obob*, despite the fact that their body-weights did not differ significantly from that of the remaining 33 animals. The use of the binomial theorem demonstrated that there was no significant difference between actual and expected number of *obob* in each litter and in the 5 litters combined ($p > 0.05$). During the experimental period in which food intake was controlled, the body weight gain of these 4 animals exceeded that of the remaining 33 by 48% ($p < 0.001$), despite the fact that their food intake was identical (Figure).

After this period, all animals were allowed to have free access to food for a further 2 months during which time their body weight increased steeply to reach a new plateau. By the end of this period the difference between lean and obese animals' body weight had doubled (Figure).

This experiment demonstrates that the body weight of mice homozygous for the obese gene (*obob*) and that

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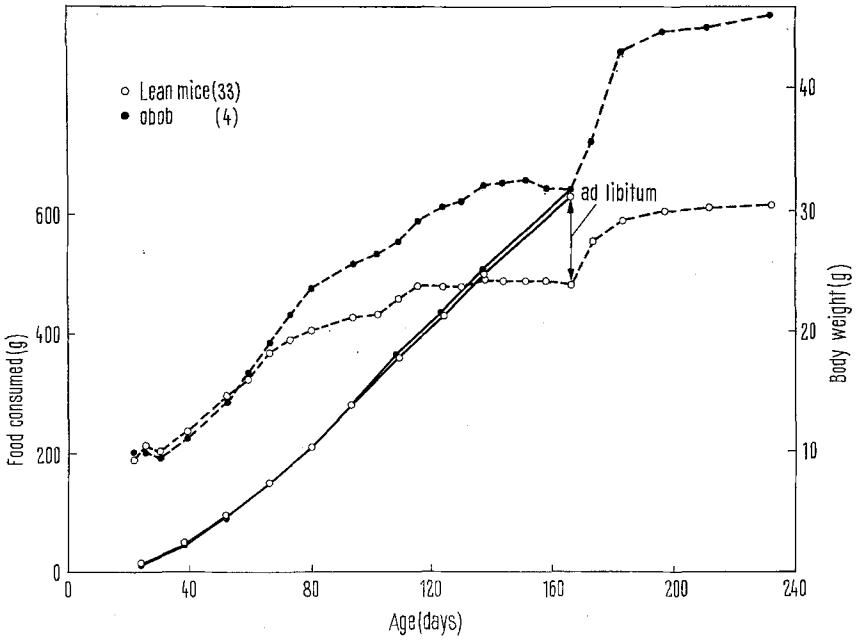

Mean food intake (continuous lines) and body weight (interrupted lines) of growing lean mice and *obob* (for details of experiment see text).

of phenotypically normal mice (*ObOb* or *Obob*) are significantly different even when their food intake is identical. The fact that *obob* can become obese even in the absence of excessive food intake suggests that the hyperphagia of the *obob* cannot account entirely for their obesity. Other contributing factors could be an increase in the useful energy of food captured, a decrease in the energy expenditure, or both.

But if *obob* can become obese by such means and with normal food intake, why are they hyperphagic? An answer to this question is difficult unless one postulates a genetically predetermined level of stored energy or adipose tissue mass, i.e., the Lipostatic theory of obesity[6]. In this context, the hyperphagia of the *obob* is only one means by which the animal may achieve the genetically determined mass of adipose tissue. It is conceivable that the muscle resistance[3,4] and the hyperinsulinism[7,8] of these animals are further means to the same end.

The data of VAN PUTTEN, VAN BEKKUM and QUERIDO[9] and those of HAN[10], showing greater than normal deposition of fat in animals with hypothalamic lesions despite normal food intake, are in keeping with the present findings. Also, LIEBELT[11], working with goldthioglucose-injected rats, concluded that the dispersed fat organs are integrated into 'the adipose tissue mass' and the latter influences the regulation of food intake[11].

Thus, in both the obese hyperglycaemic mice (metabolic obesity) and in animals with hypothalamic lesions (regulatory obesity), hyperphagia might be secondary to an alteration of the homoeostatic level of 'adipose tissue mass'.

Zusammenfassung. Nachweis, dass bei einem Mäusestamm, welcher eine genetisch bedingte Fettsucht aufweist, die Fettsucht auch bei Nahrungseinschränkung auftritt, wenn diese Tiere homozygot sind, dies im Gegensatz zu heterozygoten Tieren. Daraus wird der Schluss gezogen, dass diese Fettsucht nicht primär alimentär, sondern durch einen genetischen, metabolischen Defekt bedingt ist.

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Inhibition of Ovarian Compensatory Hypertrophy by Implants of Atropine in the Hypothalamus

The inhibition of ovulation in the rat by systemic injections of atropine[1] as well as hypothalamic local implantation[2] suggest the participation in the control of folliculotrophic release of a midbrain hypothalamic cholinergic system related to the control of different vegetative functions[3].

Knowing that hemicastration in the rat gives rise to ovarian hypertrophy as a result of increased gonadotrophic release, we used this procedure in order to study the inhibitory action of atropine.

The experiments were carried out on albino rats of our strain weighing 150–200 g and having had at least 3