RESULTS
Physical and behavioral aspects

With the rise in environmental temperature the experimental rats at the initial stage showed a period of overactivity and they were observed to lick at their own fur and that of the other animals in the same chamber. These changes were accompanied by a significant increase in water intake of the animals. With the progress of experiment, overactivity decreased progressively, they stopped licking their fur and water intake returned to normal. There was a rise in rectal temperature of experimental rats by 1-2°C above control and this was observed as early as 6 hours of exposure at 37.5°C and same degree of hyperthermia persisted till the termination of experiment on the 45th day of continuous exposure at high temperature. Food intake of experimental rats was significantly reduced and this was demonstrable even at 24 hours of exposure. The decreased food intake of rats at high temperature continued till the end of the experiment.

There was a progressive and sharp loss of body weight and liver weight of rat during the first 15 days of exposure to high environmental temperature (Fig. 2). Continuation of exposure at 37.5°C beyond 15 days did
EFFECT OF HIGH AMBIENT TEMPERATURE ON BODY WEIGHT AND ORGAN WEIGHT OF RAT

- BODY WEIGHT
- HEART
- LIVER WEIGHT
- ADRENAL WEIGHT

PERCENTAGE DEVIATION FROM CONTROL

DAYS OF EXPOSURE TO 37.5°C
The body weight and organ weights of rats exposed to 37.5°C have been computed as the percent of deviation from respective control values represented as 0.
not cause any further loss of liver and body weight of experimental rats though the weight of the organ and that of the body remained significantly lower than control during the entire span of thermal treatment. Loss of heart weight in rats was maximum at 7 days of exposure and thereafter the heart weight of experimental rats continued to remain in a steady state which was significantly below control level. Weight of adrenals in experimental rats was not altered significantly at any stage of exposure to 37.5°C.

Computation of results in terms of organ weight to body weight ratio (Fig. 3) revealed a significant increase in adrenal weight to body weight ratio of experimental group of rats due to loss of their body weight without any change in the weight of adrenals (Fig. 2). The loss of heart weight in experimental rats was arrested after 7 days while the loss of their body weight continued thereafter. This led to a resultant increase in the expression of heart weight to body weight ratio in case of experimental rats during the period of 10-30 days of thermal treatment. Liver weight to body weight ratio was not increased in rats at any stage of exposure at high temperature as the loss of
EFFECT OF HIGH AMBIENT TEMPERATURE ON ORGAN WEIGHT/BODY WEIGHT RATIO OF RAT

PERCENTAGE DEVIATION FROM CONTROL

DAYS OF EXPOSURE TO 37.5°C

BODY WEIGHT
HEART/BODY
LIVER/BODY
ADRENAL/BODY

CONTROL
Fig. 3 Organ weight to body weight ratio in respect to different organs of rats exposed to 37.5°C, has been computed as the percent deviation from respective control values represented as 0.
liver weight ran almost parallel to the loss of body weight of experimental group of rats.

Dry weight to wet weight ratio of rat tissue was determined for an assessment of their water content and the results of water content of various tissues of experimental rats have been expressed as percent of deviation from their control values (Fig. 4,5). It has been observed that adrenals, liver, lung, kidney, stomach, heart and skeletal muscle of experimental rats had different degree of accumulation of water (2-15% compared to controls) at different stages of thermal exposure. A minor degree of water accumulation was noted in adrenals and liver as early as 24 hours of treatment and water content of adrenals, lung and kidney of experimental rats was always higher during the entire span of thermal treatment (Fig. 5). At the initial phase of exposure of rats at 37.5°C, the water content of muscular tissues of experimental rat was less than control values. Detectable accumulation of water in stomach and skeletal muscle was observed on the 7th day of continuous thermal treatment and in case of heart muscle the presence of extra water has been documented on the 15th day only. The excess of water in myocardial tissue, skeletal muscle and liver of experimental rats was retained till 30th day of experiment (Fig. 4).
EFFECT OF HIGH AMBIENT TEMPERATURE ON DRY WEIGHT/WET WEIGHT RATIO OF RAT TISSUES

- HEART
  - CONTROL
  - 24 Hrs
  - 3 D
  - 7 D
  - 45 D
- SKELETAL MUSCLE
  - CONTROL
  - 24 Hrs
  - 3 D
  - 7 D
  - 15 D
  - 30 D
  - 45 D
- STOMACH
  - CONTROL
  - 24 Hrs
  - 3 D
  - 7 D
  - 15 D
- LIVER
  - * SAME AS MUSCLE

- PERCENTAGE DEVIATION FROM CONTROL
Fig. 4 Water content of different tissues of rat exposed to 37.5°C, has been assessed from the dry weight to wet weight ratio of respective tissues. Results have been computed as the percent deviation from respective control values represented as 0. Period of thermal exposure is reflected against each bar.

LEGEND
EFFECT OF HIGH AMBIENT TEMPERATURE ON DRY WEIGHT/WET WEIGHT RATIO OF RAT TISSUES

KIDNEY

ADRENAL

PERCENTAGE DEVIATION FROM CONTROL
LEGEND

Fig. 5  Same as Fig. 4 legend.
Metabolic aspects

Carbohydrate - The first demonstrable change in the concentration of blood sugar of rat was observed at 6-8 hours of thermal treatment when the animals became hypoglycemic and hypoglycemia persisted till 3-7 days (Fig. 6). The concentration of blood sugar in experimental rats returned to control value on 15th day and thereafter continued residency at high temperature did not alter the blood sugar level of rats (Fig. 7). It has been observed that rats exposed to 37.5°C for 15 days or above were incapable of handling the exogenous glucose as evinced by their maintenance of high specific activity of glucose in serum, even at 5 hours after the receipt of an intraperitoneal tracer dose of glucose-\(^{14}\)C (Fig. 8).

Glycogen content of liver in experimental rats was lower than control during 6-24 hours of exposure at 37.5°C. Continued maintenance of high ambient temperature for 3 days normalized the glycogen content of liver and the hepatic glycogen of experimental rats remained same as control till the termination of the experiment on the 45th day of continuous heat exposure (Fig. 9).
BLOOD GLUCOSE OF RAT AT HIGH AMBIENT TEMPERATURE
PART I

mg/100 ml SERUM

P<0.01

P<0.02

CONTROL

EXPOSED TO HEAT

SEM
Serum concentration of glucose in rat was determined from the blood collected immediately after guillotine decapitation. All results are mean of 5 samples with ± SEM.
BLOOD GLUCOSE OF RAT AT HIGH AMBIENT TEMPERATURE
PART II

Mg./100 ml. SERUM

0 20 40 60 80

15d 30d 45d

○ CONTROL
● EXPOSED TO HEAT
■ MEAN OF TWO VALUES
SEM
Fig. 7  Same as Fig. 6 legend.
RETENTION OF GLUCOSE $^{14}$C(W) IN RAT BLOOD AT HIGH AMBIENT TEMPERATURE

![Graph showing retention of glucose labeled with statistical significance and temperatures.](image)
Each rat of control and experimental groups received intraperitoneal dose of 10 μCi glucose-U-14C at 300 minutes before they were killed by guillotine decapitation. Serum was separated from blood and kept in frozen state prior to analysis. The samples were processed as per recommendation (Jones, G.B. Anal. Biochem. 12:249, 1965) for the measurement of glucose-14C activity in serum, by Packard Liquid Scintillation Counting System, Model No. 3005.
TISSUE GLYCOGEN OF RAT AT HIGH AMBIENT TEMPERATURE
PART II

LIVER

GASTROCNEMIUS

μ MOLE C-6/100 mg WET WEIGHT

3 d 7 d 15 d 30 d 45 d

CONTROL
EXPOSED TO HEAT
SEM.
Fig. 9 Periods of exposure for experimental rate at 37.5°C has been shown against respective bars. Each rat of control and experimental groups was killed by guillotine decapitation and tissues were weighed immediately on removal for measurement of glycogen content. Glycogen expressed as umole G-6 per 100 mg wet tissue.
Glycogen store of skeletal muscle has been observed to be unaffected by high ambient temperature throughout the course of experiment (Fig. 9).

The cardiac glycogen of rat has been observed to increase significantly \((p < 0.001)\) at 5-8 hours of exposure at 37.5°C and heart glycogen of experimental rats remained high with same magnitude of difference from control at all times during the entire period of thermal treatment (Fig. 10). In search of a mechanism of increased cardiac glycogen of rat at high ambient temperature intraperitoneal tracer dose of glucose-\(^{14}C\) was used for an assessment of rate of synthesis of myocardial glycogen in experimental rats. The results on specific activity of \(^{14}C\) glucose per umole of G-6 unit of cardiac glycogen (Fig. 11) revealed considerably low utilization of added glucose in the synthesis of heart glycogen at high temperature. This reflected increased myocardial store of carbohydrate in experimental rats was not effected by increased rate of glycogenesis.
MYOCARDIAL GLYCOGEN OF RAT AT HIGH AMBIENT TEMPERATURE

μMOLE C-6/100 mg WET WEIGHT

6 hrs.  3 d  7 d  15 d  30 d  45 d

p < 0.001
LEGEND

Fig. 10  Same as Fig. 9 legend.
EFFECT OF HIGH AMBIENT TEMPERATURE ON MYOCARDIAL GLYCOGEN SYNTHESIS (C-14 DPM/μmole C-6 UNIT)

PERCENTAGE DEVIATION FROM CONTROL

HOURS

DAYS

EXPOSURE TO 37.5°C
Each rat of control and experimental groups received intraperitoneal dose of 10 uCi glucose-U-\(^{14}\)C at 50 minutes before they were killed by guillotine decapitation. Heart was weighed immediately on removal and tissues were processed for extraction and measurement of glycogen. The specific activity of \(^{14}\)C-glucose per umole C-6 unit of glycogen was determined and the experimental results computed as percent deviation from respective control values represented as 0.
Lipid - No change in serum concentration of FFA was observed in experimental rats at the initial stage of exposure at high ambient temperature. Only on 3rd day of exposure titratable FFA in serum of experimental rats was significantly reduced (Fig. 12) and the lower serum concentration of FFA in rats at 37.5°C was maintained during the remaining part of the experiment.

Total lipid content per unit weight of heart (Table II), per unit weight of liver (Table III) and per unit weight of skeletal muscle in rat was unaffected throughout the exposure at 37.5°C.
EFFECT OF HIGH AMBIENT TEMPERATURE ON SERUM CONC. OF FFA IN RAT

CONTROL

EXPERIMENTAL

SEM

FFA IN μg PER LITRE OF SERUM

0 3 7 15 30 45

DAYS OF EXPOSURE TO 37.5°C
Fig. 12 Each rat of control and experimental groups was killed by guillotine decapitation. Serum was separated from blood and stored in frozen state prior to analysis. All results are mean of 5 samples ± SEM. Numbers represent usg FFA per liter of serum p 0.02, 0.01.

**LEGEND**
### Table II

**Effect of High Ambient Temperature on Total Lipid Content of Heart Muscle of Rat**

<table>
<thead>
<tr>
<th>Control</th>
<th>8 hour</th>
<th>24 hour</th>
<th>3 day</th>
<th>7 day</th>
<th>15 day</th>
<th>30 day</th>
<th>45 day</th>
</tr>
</thead>
<tbody>
<tr>
<td>55</td>
<td>54</td>
<td>54</td>
<td>53</td>
<td>48</td>
<td>50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>±2</td>
<td>±8</td>
<td>±7</td>
<td>±6</td>
<td>±7</td>
<td>±4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(5)</td>
<td>(5)</td>
<td>(7)</td>
<td>(3)</td>
<td>(8)</td>
<td>(9)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table II  The results are in mg of total lipid per gm wet weight of tissue. Figures have been expressed as mean ± SEM. Numbers in parenthesis represents number of samples in each group.
TABLE III

EFFECT OF HIGH AMBIENT TEMPERATURE ON TOTAL LIPID CONTENT OF LIVER OF RAT

<table>
<thead>
<tr>
<th>Control</th>
<th>8 hour</th>
<th>24 hour</th>
<th>3 day</th>
<th>7 day</th>
<th>15 day</th>
<th>30 day</th>
<th>45 day</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>56</td>
<td>58</td>
<td>48</td>
<td>50</td>
<td>51</td>
<td>52</td>
<td></td>
</tr>
<tr>
<td>±4</td>
<td>±5</td>
<td>-</td>
<td>±4</td>
<td>±6</td>
<td>±3</td>
<td>±2</td>
<td></td>
</tr>
<tr>
<td>(3)</td>
<td>(5)</td>
<td>(5)</td>
<td>(5)</td>
<td>(5)</td>
<td>(8)</td>
<td>(10)</td>
<td></td>
</tr>
</tbody>
</table>
Table III  Same as Table II legend.
Protein - Total protein content per unit weight of heart, per unit weight of liver, per unit weight of skeletal muscle and per unit volume of serum in rats was not altered at any stage of their exposure at high temperature (Table IV, V).

It has been observed that the maintenance of adult rats at 27.5°C for short or long periods failed to influence the synthesis of different tissue protein as revealed by the rate of incorporation of leucine-1-¹⁴C per unit weight of protein in heart, liver and skeletal muscle (Table VII).

Non-protein nitrogen - Serum concentration of urea in experimental rats at 37.5°C was same as their control litter mates throughout the course of the experiment (Table VIII).
### TABLE IV

**EFFECT OF HIGH AMBIENT TEMPERATURE ON TOTAL PROTEIN CONTENT OF HEART MUSCLE OF RAT**

<table>
<thead>
<tr>
<th>Control</th>
<th>8 hour</th>
<th>24 hour</th>
<th>3 day</th>
<th>7 day</th>
<th>15 day</th>
<th>30 day</th>
<th>45 day</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>190</td>
<td>200</td>
<td>195</td>
<td>190</td>
<td>178</td>
<td>187</td>
<td></td>
</tr>
<tr>
<td>±19</td>
<td>±12</td>
<td>-</td>
<td>±15</td>
<td>±9</td>
<td>±15</td>
<td>±18</td>
<td>-</td>
</tr>
<tr>
<td>(5)</td>
<td>(5)</td>
<td>(4)</td>
<td>(5)</td>
<td>(3)</td>
<td>(6)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
All the tissues were weighed immediately on removal and were homogenized in chilled trichloroacetic acid (TCA) for isolation of total protein by precipitation reaction. TCA precipitate was treated with NaOH and total protein in the samples were determined by biuret reaction. The results are in mg of total protein per gm of wet weight of tissues. Figures have been expressed as mean ± SEM. Numbers in parenthesis represents number of sample in each group.
<table>
<thead>
<tr>
<th></th>
<th>Control</th>
<th>8 hour</th>
<th>24 hour</th>
<th>3 day</th>
<th>7 day</th>
<th>15 day</th>
<th>30 day</th>
<th>45 day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serum</td>
<td>±2</td>
<td>±3</td>
<td></td>
<td>±3</td>
<td>±1</td>
<td>±5</td>
<td>±1</td>
<td></td>
</tr>
<tr>
<td>(5)</td>
<td>(5)</td>
<td>(3)</td>
<td>(4)</td>
<td>(3)</td>
<td>(6)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liver</td>
<td>±10</td>
<td>±20</td>
<td>±28</td>
<td>±30</td>
<td>±10</td>
<td>±19</td>
<td>±12</td>
<td>±15</td>
</tr>
<tr>
<td>(5)</td>
<td>(5)</td>
<td>(5)</td>
<td>(3)</td>
<td>(5)</td>
<td>(3)</td>
<td>(5)</td>
<td>(4)</td>
<td></td>
</tr>
<tr>
<td>Skeletal muscle</td>
<td>±15</td>
<td>±11</td>
<td>±10</td>
<td>±23</td>
<td>±14</td>
<td>±25</td>
<td>±13</td>
<td>±25</td>
</tr>
<tr>
<td>(5)</td>
<td>(5)</td>
<td>(5)</td>
<td>(3)</td>
<td>(5)</td>
<td>(3)</td>
<td>(5)</td>
<td>(4)</td>
<td></td>
</tr>
</tbody>
</table>
LEGEND

Table V  Same as Table IV legend. Total protein content in serum has been expressed as mg total protein per ml serum.
### TABLE VI

**EFFECT OF HIGH AMBIENT TEMPERATURE ON MYOCARDIAL PROTEIN SYNTHESIS IN RAT**

<table>
<thead>
<tr>
<th></th>
<th>8 hour</th>
<th>24 hour</th>
<th>3 day</th>
<th>7 day</th>
<th>15 day</th>
<th>30 day</th>
<th>45 day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>252</td>
<td>245</td>
<td>239</td>
<td>297</td>
<td>310</td>
<td>305</td>
<td>251</td>
</tr>
<tr>
<td>±17</td>
<td>±16</td>
<td>±30</td>
<td>±32</td>
<td>±54</td>
<td>±45</td>
<td>±32</td>
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</tr>
<tr>
<td>(5)</td>
<td>(5)</td>
<td>(4)</td>
<td>(5)</td>
<td>(3)</td>
<td>(6)</td>
<td>(3)</td>
<td></td>
</tr>
</tbody>
</table>
Each rat of control and experimental groups received intraperitoneal dose of 10 μCi leucine-\textsuperscript{14}C and the animals were killed one hour after the receipt of radioisotope. Tissue samples were processed in similar way as in Table IV legend. All results are in LPM per mg of protein. Figures have been expressed as mean ± SEM. Numbers in parentheses represent number of samples in each group.

| Table VI | Each rat of control and experimental groups received intraperitoneal dose of 10 μCi leucine-\textsuperscript{14}C and the animals were killed one hour after the receipt of radioisotope. Tissue samples were processed in similar way as in Table IV legend. All results are in LPM per mg of protein. Figures have been expressed as mean ± SEM. Numbers in parentheses represent number of samples in each group. |
### Table VII

**Effect of High Ambient Temperature on Protein Synthesis in Liver and Skeletal Muscle of Rat**

<table>
<thead>
<tr>
<th></th>
<th>Control</th>
<th>8 hour</th>
<th>24 hour</th>
<th>3 day</th>
<th>7 day</th>
<th>15 day</th>
<th>30 day</th>
<th>45 day</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Liver</strong></td>
<td>574</td>
<td>468</td>
<td>552</td>
<td>456</td>
<td>527</td>
<td>616</td>
<td>458</td>
<td></td>
</tr>
<tr>
<td></td>
<td>±90</td>
<td>±45</td>
<td>±50</td>
<td>±82</td>
<td>±74</td>
<td>±55</td>
<td>±50</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(5)</td>
<td>(4)</td>
<td>(5)</td>
<td>(4)</td>
<td>(4)</td>
<td>(3)</td>
<td>(4)</td>
<td></td>
</tr>
<tr>
<td><strong>Skeletal</strong></td>
<td>110</td>
<td>91</td>
<td>130</td>
<td>-</td>
<td>95</td>
<td>98</td>
<td>98</td>
<td></td>
</tr>
<tr>
<td><strong>muscle</strong></td>
<td>±23</td>
<td>±14</td>
<td>±25</td>
<td>-</td>
<td>±17</td>
<td>±20</td>
<td>±25</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(4)</td>
<td>(4)</td>
<td>(5)</td>
<td>(4)</td>
<td>(3)</td>
<td>(4)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
LEGEND

Table VII  Same as Table VI legend.
## Table VIII

**Effect of High Ambient Temperature on Serum Concentration of Urea in Rat**

<table>
<thead>
<tr>
<th></th>
<th>8</th>
<th>24</th>
<th>7</th>
<th>15</th>
<th>30</th>
<th>45</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>66.7</td>
<td>62.9</td>
<td>69.0</td>
<td>53.0</td>
<td>62.3</td>
<td>62.2</td>
</tr>
<tr>
<td></td>
<td>±4.6</td>
<td>±4.9</td>
<td>±1.5</td>
<td>±5.6</td>
<td>±10.7</td>
<td>±4.7</td>
</tr>
<tr>
<td></td>
<td>(5)</td>
<td>(5)</td>
<td>(4)</td>
<td>(3)</td>
<td>(2)</td>
<td>(3)</td>
</tr>
</tbody>
</table>
Table VIII  Rats were killed by guillotine decapitation and serum were collected and kept in frozen state prior to analysis. Results are in mg of urea per 100 ml serum. Figures have been expressed as mean ± SEM. Numbers in parentheses represent number of samples in each group.
Circulatory aspects

The fractional distribution of cardiac output in different parts of the body of control and experimental rats was determined by the method of Sapirstein using $^{86}\text{Rb}$ as a radioactive tracer. Analysis of results revealed that blood flow in spleen of experimental rat did not alter at least at tested intervals of exposure at high temperature. In contrast, fractional distribution of cardiac output in heart muscle and thyroid progressively decreased during the course of experiment. At the end of the 45th day of continuous exposure at 37.5°C, the availability of blood in heart muscle (Fig. 13) and thyroid of experimental rats was reduced by about 50% compared to control.
EFFECT OF HIGH AMBIENT TEMPERATURE
ON CORONARY FLOW OF RAT

PERCENT OF CARDIAC OUTPUT
(AS 86 Rb) DISTRIBUTED
PER HEART

CONTROL
6 HRS
7 DAY
30 DAY
45 DAY
Each rat of experimental and control groups received 5 uCi of 85Rb through jugular vein under nembutal anesthesia. Rats were killed by decapitation at 60 seconds after the receipt of radiisotope. Radioactivity in different tissues were measured as per recommendation using Nuclear Chicago Automatic Gamma Well Counting System, Model No. 4219. Period of thermal treatment of experimental rats has been reflected against each bar.
**Endocrine aspects**

Thyroid - Exposure of laboratory rats at 37.5°C for a minimum period of 8 hours led to a significant suppression of thyroid function characterized by decreased 20 minutes uptake of $^{131}\text{I}$ by thyroid tissue (Fig 14), decreased organification of radioactive iodine in thyroid and reduced thyroidal iodide pump as revealed by thyroid $^{131}\text{I}$/serum $^{131}\text{I}$ ratio (Fig. 15). It has also been observed that suppression of thyroid function in experimental rats persisted till the 45th day of continuous exposure at 37.5°C. This has been documented by different thyroid function tests including the study of thyroidal trapping of $^{99m}\text{Tc}$ in experimental rats (Fig. 16).

Adrenals - The weight of adrenals of experimental rats were not altered at any stage of exposure at 37.5°C (Fig 2) but due to loss of body weight in experimental rats the expression of results on adrenal weight to body weight ratio was significantly increased (Fig. 3). The total cholesterol content per unit weight of adrenal gland was significantly decreased in rat exposed to 37.5°C for 15 days and above.
HIGH ENVIRONMENTAL TEMPERATURE:

THYROIDAL UPTAKE OF 131-IODINE

1.5

1.0

0.5

0.0

P.C. 131I/10 mg WET TISSUE/20 min.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control (5)</td>
<td></td>
</tr>
<tr>
<td>Exposed to heat for 8 hrs. (5)</td>
<td></td>
</tr>
</tbody>
</table>

SEM

p<0.01
Each rat of control and experimental groups received intraperitoneal dose of $0.5 \mu$Ci $^{131}I$. Animals were killed by guillotine decapitation 20 minutes after the receipt of isotope for early hour uptake test as per recommendations (1. Alexander, W.D., McF. Hardin, R. and Shimmin, J. Studies of the thyroid iodide 'trapping' in Man. In Recent Progress in Hormone Research. Ed by Actwood, E.B. Academic Press, New York/London, 1959. 2. Report of an International Atomic Agency Panel: Thyroid radionuclide uptake measurements. Int. J. Appl. Rad. Isotopes 23:1305, 1972). Thyroid lobus were weighed immediately on removal and radioactivity in thyroid was measured directly using Automatic Gamma Counting System, Model No. 4219.
HIGH ENVIRONMENTAL TEMPERATURE: THYROIDAL IODIDE PUMP (OPEN GLAND)

THYROIDAL [\(\text{I}^3\)]/SERUM 20 MIN.

- CONTROL (5)
- EXPOSED TO HEAT FOR 8 HOURS (5)

SEM

\(p < 0.001\)
This was a part of the experiment shown in Fig. 14. Each rat of control and experimental group received intraperitoneal dose of 0.5 uCi $^{131}$I. Animals were killed by guillotine decapitation 20 minutes after receipt of radioisotope. $^{131}$I activity in thyroid and serum was measured by Automatic Gamma Counting System, Model No. 4219.
EFFECT OF HIGH AMBIENT TEMPERATURE ON THYROIDAL TRAPPING OF $^{99m}$Tc IN RAT

- Control
- 15 day
- 30 day
- 45 day

$^{99m}$Tc cpm/mg thyroid per 1 hr

0 200 400
Fig. 16 Each rat of control and experimental groups received intraperitoneal dose of $^{99m}$Tc as tracer. Sixty minutes after the receipt of isotope the animals were killed by guillotine decapitation and thyroid tissue were weighed immediately on removal. $^{99m}$Tc activity in thyroid was measured by Automatic Gamma Counting System, Model No. 4219.
Estrus cycle - Effects of high ambient temperature on estrus cycle of female rats have been examined by vaginal smear technique. It has been observed that long exposure at 32-5°C caused lengthening metestrus at the expense of proestrus-estrus phase of estrus cycle in laboratory rats (Table IX).
<table>
<thead>
<tr>
<th>State</th>
<th>Control (5)</th>
<th>30 day (7)</th>
<th>45 day (10)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metestrus</td>
<td>20%</td>
<td>57%</td>
<td>60%</td>
</tr>
<tr>
<td>Diestrus</td>
<td>20%</td>
<td>14.5%</td>
<td>30%</td>
</tr>
<tr>
<td>Proestrus</td>
<td>40%</td>
<td>-</td>
<td>10%</td>
</tr>
<tr>
<td>Estrus</td>
<td>20%</td>
<td>28.5%</td>
<td>-</td>
</tr>
</tbody>
</table>

**TABLE IX**

**EFFECT OF HIGH AMBIENT TEMPERATURE ON ESTRUS CYCLE**
Table IX  Percentage distribution has been calculated from the total number of rats in each group shown in parentheses.