produces a distinct and sustained decrease. The maximum decrease (2° to 4°C.) is reached about 2 hours after injection and the return to normal is slow—4 to 7 hours.

The symptoms produced by the larger doses were shivering, retching and vomiting in the pigeons and shivering and drowsiness in the rats.

Assuming that the nitro groups were in a measure responsible for the greater decreases produced by sodium dinitrosalicylate than are produced by sodium salicylate we compared the temperature decreasing effects of sodium 3,5 dinitrobenzoate and sodium benzoate.

Sodium 3,5 dinitrobenzoate causes definite decreases in body temperature of normal pigeons and rats but is not as effective as sodium dinitrosalicylate and the similar symptoms produced are less severe.

In 12 control experiments using untreated animals and animals injected with solutions of antipyrine or sodium salicylate or sodium benzoate, temperature variations less than 2°C. were obtained in all cases.

In 11 pigeon and 10 rat experiments using sodium dinitrosalicylate and in 6 pigeon and 11 rat experiments using sodium dinitrobenzoate, marked depressant effects (more than 2°C.) on body temperature were produced.

## 7859 C

## Low Basal Metabolic Rates Obtained by Low Calorie Diets in Coronary Artery Disease.

A. M. MASTER, HARRY L. JAFFE AND S. DACK.

*From the Cardiovascular Service and the Medical Services of the Mount Sinai Hospital, New York.*

That a diminished food intake results in lowered basal metabolic rates has been known for many years. It is only necessary to mention the classical work performed by Benedict[1] and reviewed by Lusk.[2] In view of the fact that the basal metabolic rate is raised in congestive heart disease, tachycardia, severe dyspnea, and in dias-

[1] Benedict, F. G., Niles, W. R., Roth, P., and Smith, H. M., Carnegie Institute of Washington, 1919, Publication 280.

[2] Lusk, G., *Physiol. Rev.*, 1921, **1**, 523.

tolic hypertension,[3] we wished to determine the rates of patients who had sustained an acute coronary artery occlusion and who were placed on a diminished food intake.

An adequately balanced 800 calorie diet containing 80 gm. of

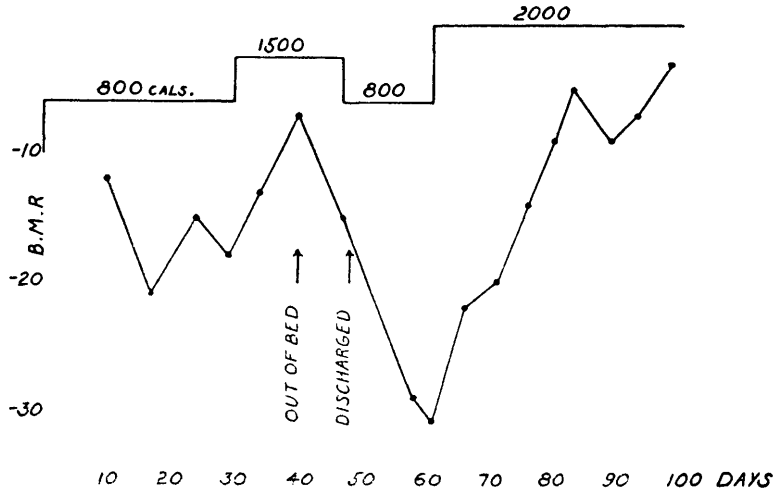


FIG. 1.

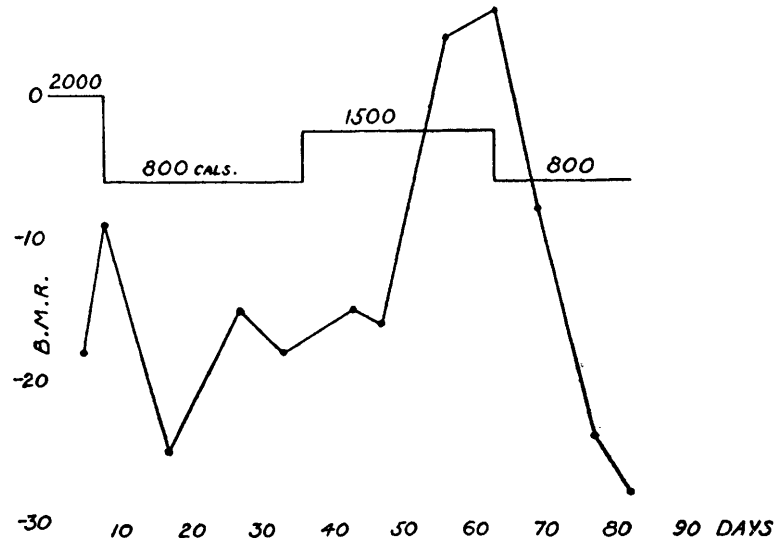


FIG. 2.

[3] Peabody, F. W., Meyer, A. L., and DuBois, E. F., *Arch. Int. Med.*, 1916, **17**, 980. Hamburger, W. W., and Lev, M. W., *Am. Heart J.*, 1925, **1**, 240. DuBois, E. F., Basal Metabolism in Health and Disease, Lea and Febiger, 1924, 306. Boas, E. P., and Shapiro, S., *J. Am. Med. Assn.*, 1925, **84**, 1558.

carbohydrate, 50 gm. of protein, and 30 gm. of fat was prescribed. Care was taken to include adequate vitamins. The fluid intake was limited to 1,000-1,200 cc. per day. Basal metabolic rates were determined frequently and control readings were obtained either at the beginning of the experiment or when the patient's diet was increased. In no case was there any pulmonary congestion or evidence of myocardial decompensation at the time readings were made. In addition to the 7 patients, (Cases I to VII) who suffered from coronary thrombosis we are including one case of severe anginal syndrome caused by coronary artery sclerosis (Case VIII). The latter was always ambulatory and , although a sick man, travelled to and from our clinic. After discharge from the hospital the patients returned regularly for the basal metabolism test.

Graphs of the first 4 patients followed 3 or more months are presented as well as tables of all 8 cases. In the latter for the sake of brevity only the basal metabolic readings characteristic of each

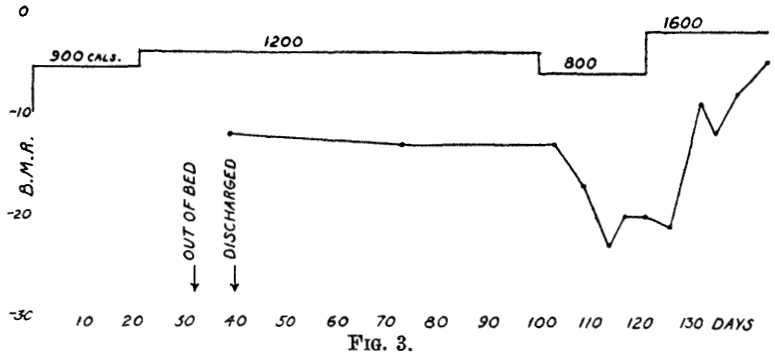


FIG. 3.

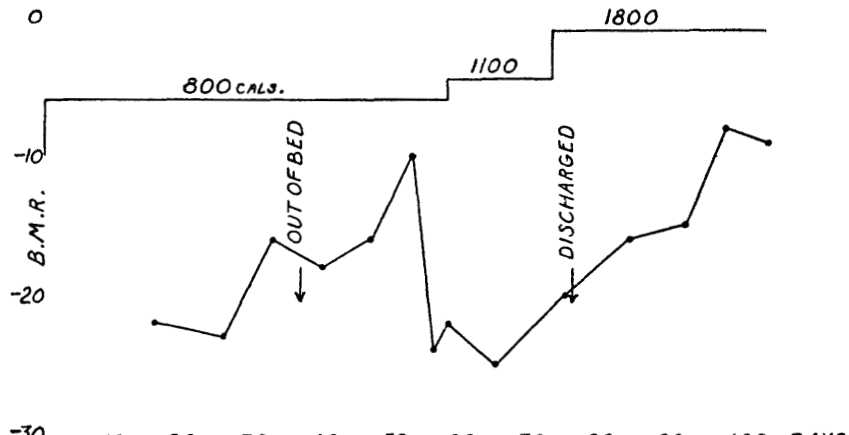


FIG. 4.

TABLE I.

| | Sex | Age | Diet | Days on Diet* | Wt. | BMR |
|---|---|---|---|---|---|---|
| 1. | M. | 59 | 800 | 17-29 | 132 | —15 to —21 |
| | | | 1500 | 10-17 | 130 | — 7 to —15 |
| | | | 800 | 9-12 | 131 | —29 to —31 |
| | | | 2000 | 19-37 | 139 | — 3 to — 9 |
| 2. | M. | 50 | Reg. | 8 | 165 | — 9 |
| | | | 800 | 9-25 | 158 | —15 to —25 |
| | | | 1500 | 20-27 | 160 | + 4 to + 6 |
| | | | 800 | 14-25 | 155 | —19 to —28 |
| 3. | M. | 47 | 1200 | 20-99 | 108 | —13 |
| | | | 800 | 14-20 | 104 | —20 to —23 |
| | | | 1600 | 18-23 | 107 | — 5 to — 8 |
| 4. | F. | 44 | 800 | 16-64 | 136 | —16 to —25 |
| | | | 1800 | 33-39 | 139 | — 8 |
| 5. | M. | 52 | 800 | 11-19 | 153 | — 4 to — 6 |
| | | | 800 | 25-33 | 146 | —10 to —19 |
| | | | 2000 | 20-35 | 152 | + 2 to + 8 |
| 6. | F. | 57 | 800 | 5-25 | 114 | — 8 to —15 |
| | | | 800 | 30-44 | 106 | —17 to —29 |
| 7. | M. | 62 | 800 | 16 | 140 | —11 |
| | | | 800 | 24-57 | 132 | —18 to —22 |
| 8. | M. | 62 | Reg. | | 230 | — 3 |
| | | | 800 | 27 | 213 | — 3 |
| | | | 800 | 30-45 | 203 | —21 to —25 |

* Indicates the number of days on the diet specified, during which time the designated range of basal metabolic rates occurred.

particular level of feeding are recorded. It will be observed that in 2 to 4 weeks, the basal metabolic rate ranged between —20 and —30%.* In the first 3 patients we lowered and increased the food intake on several occasions with a corresponding decrease or rise in the basal metabolic rate. On return to a regular diet the basal metabolic rate rose to normal, usually in about 1½ to 2½ weeks. Rest in bed, walking about the ward, and even slight to moderate activity after discharge from the hospital did not affect the result. (None of our patients has as yet recovered sufficiently from his disease to be able to return to work.) In other words, the decrease in basal metabolic rate was caused by the diminished caloric intake.

Much interest has been aroused by the operation of complete thyroidectomy advocated by Blumgart, Levine and others[4] for the

* The rates are based on the DuBois normal standards as modified by Boothby and Sandiford, *Am. J. Phys.*, 1929, **90**, 291.

[4] Blumgart, H. L., Levine, S. A., and Berlin, D. D., *Arch. Int. Med.*, 1933, **51**, 866.

treatment of patients suffering from congestive heart failure or the anginal syndrome. These authors have obtained low basal metabolic rates in their patients. In fact, their object seems to be to keep the basal metabolic rate of their patients between —20 to —30%, results that we obtain on an 800 calorie diet. It is therefore suggested that this diet may produce over a period of one to 3 months or more, results comparable to those obtained by complete thyroidectomy over a long period of time.

It appears that in a patient with coronary artery thrombosis kept on an 800 calorie diet the basal metabolic rate may be lowered just as in a normal person.

A lowered basal metabolic rate is associated with a diminished velocity of the blood flow and a decreased amount of work of the heart. Hence low caloric diets should help patients with myocardial impairment. Lusk[2] and DuBois[5] have already discussed this theoretical phase. One of us (A.M.M.) has been treating his coronary thrombosis patients by bed rest and an 800 calorie diet for 7 years with excellent results.

## 7860 C

## Peroxidases and Cell Activity in Developing Egg (Orthoptera).*

JOSEPH HALL BODINE AND EDGAR JOHN BOELL.

*From the Zoological Laboratory, State University of Iowa.*

Cellular activity during normal embryonic development of the common grasshopper, *Melanoplus differentialis,* at constant temperature (25°C.) is characterized by 3 distinct periods: (a) a period of rapid cell proliferation (pre-diapause), (b) a period of developmental block or cellular inactivity in which mitosis, growth, etc., are absent (diapause), (c) a period of marked differentiation and growth terminating in the hatching of the embryo (post-diapause).[1] It becomes of some interest, therefore, to determine physiological changes which accompany the various phases of cellular activity. The present discussion has to do with results of studies on the peroxidase reaction during the entire course of embryonic development.

[5] DuBois, E. F., *Bull. N. Y. Academy of Medicine,* 1933, **8**, 680.

* Aided by grant from Rockefeller Foundation for work on cellular physiology

[1] Bodine, J. H., *Physiol. Zool.,* 1932, **5**, 549.