classes. The mean of the 56 temperature values is 37.8°. The distribution, far from showing any linear correlation, appears to be entirely random, and no trend can be discerned. Ranges and mean values for the body temperature by logarithmic weight classes are summarized in Table 1. In animals ranging from 15 g to 700 kg, the mean class temperatures varied by less than ± 0.2°. The very close agreement of these values is fortuitous for such small groups in view of the variability of the individual species values ($\sigma = 1.23°$; $\sigma_{\bar{x}} = 0.40$), but it illustrates strikingly the independence of weight and body temperature. The next weight class (1000–10,000 kg) is represented by only the two genera of elephants, and although their temperature (36.0°) is lower than the other averages, this can hardly be considered a trend.

Measurements at the extremes of mammal size may be of particular significance in their bearing on this question. In the whale, Zenkovic (*6*) reported an average temperature of 37.6° within 1 hr of death and 37.1° within 2 hr of death in 4 of the larger species (est. adult wt, $5–10 \times 10^7$ g). Although these values are lower than the general average of 37.9°, they fall within one standard deviation of that value and are actually a degree higher than that for the next smaller animal, the elephant.

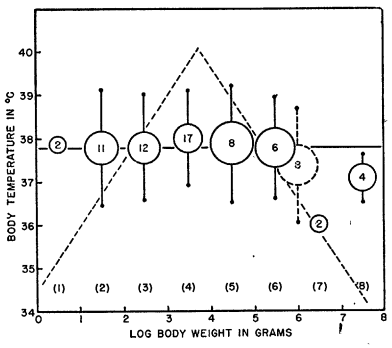

FIG. 2. Mean body temperature by logarithmic weight classes as a function of body weight. Vertical bars show standard deviations of the means; circle radii show standard errors of means; number of species averaged as indicated. The greatest difference, 0.2°, lies between the means of groups 4 and 6 and corresponds to a t value of 0.58. Even the difference between group 4 and the pooled values for group 6, plus the low elephant values (broken circle and bars), corresponds to a t value of only 1.1, still far below the required level for significance. Rodbard's postulated relations are shown as two broken lines.

At the other end of the size scale, recent measurements on the harvest mouse (*Reithrodontomys*), one of the smallest mice, with a weight of 9 g, have shown a body temperature of 38.0°. The only other information we have found in the literature on animals of less than 10 g is a single measurement of 37.8° on a shrew (*Sorex fumeus*) by Kendeigh (*7*). These values are both within 0.2° of the over-all average for mammals. Fig. 2 summarizes these data, showing the mean temperature values by logarithmic weight classes and their variability, together with Rodbard's postulated relations. It may be noted that in the case of the highest and lowest weight classes the latter relation deviates from the actual values by 3°.

Body temperature may be influenced by many variables: the taxonomic group, the diet, general or seasonal heterothermism, the latitude of origin, activity, the ambient temperature, etc. Indeed, as more data become available, some correlation with weight may be found within selected homogeneous groups.[2] But as a general phenomenon the body temperatures of various species of mammals must be considered to be independent of their weights.

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[2] A suggestion of such a trend within several of the orders, particularly in the carnivores, may be seen in Fig. 1. However, the numbers of species available for comparison in any single order are so few (6–19), and the variability is sufficiently great, that this issue cannot be decided on the basis of the data presented here.

Maintenance of Contraction of Embryonic Chick Hearts *in Vitro*

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By the use of the culture medium given below it has been possible to keep 72-hr chick embryo hearts alive and contracting for over 90 days. They were killed and fixed for study at about this time, so that we do not know as yet how long they will continue to function *in vitro*. The embryonic hearts are cultured, with the medium, on perforated cellophane disks in Carrell flasks. The flasks are tightly stoppered with sterile rubber stoppers. During the long culture period the flasks are *never opened,* and *no change* is made of the culture medium. Such a procedure is unusual in tissue culture.

The behavior of the cultured hearts varies after a few days. Some continue to contract as a unit throughout the entire period. Some show a contraction of the sino-atrial region in a phase different from that of the ventricle-bulbus region. Others finally contract only in the sino-atrial region, with an occasional spasmodic contraction of the ventricle-bulbus region.

In most cases there is practically no cell proliferation in the form of cell outgrowths and migration such as is usual in cultures of pieces of embryonic heart. The cultured hearts show a diminution of total size as the culture period continues.

The culture medium used in these experiments would seem to be of value for maintaining a function-

ing embryonic organ so that the effects of experimental environmental conditions may be studied. The medium is prepared in the following way, under sterile conditions: 5/9 ml (10 drops from a volumetric pipette) of yolk from the 72-hr incubated egg is added to 24 ml of Tyrode's solution. No further sterilization is done before using this as a culture medium.

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Comments and Communications

Sponsored Research

THE issue of January 18 contained an exchange of letters between F. A. Middlebush, president of the Association of American Universities, and Oliver Buckley, chairman of the U. S. Science Advisory Committee, concerning basic personnel policy to be adopted both by government and universities in respect to emergency research contracts.

Although I find myself in substantial agreement with all the aims outlined by Dr. Middlebush and with many of his recommendations, I cannot help but feel that he has ignored a very important aspect of the more general problem of sponsored research programs and faculty compensation. In particular, when he says that ". . . universities . . . avoid policies which make educational and basic research activities poor relations of sponsored research," I feel he is ignoring the well-known fact that, through lack of adequate funds, most universities are today placed in the unfortunate position of not being able to avoid adopting policies that make educational and basic research activities poor relations, not only to sponsored research but also to government and industrial research quite generally. Most universities are not paying adequately for faculty services nor, in the main, are they sufficiently endowed to do so.

Since there is no absolute yardstick for measuring what is an adequate salary, adequacy can only be gauged by such results as (1) the attractiveness of faculty positions to younger, qualified people planning careers, and (2) the competition offered by other employment to faculty members. Without being able to quote figures, it is my personal observation that most universities are coming off second best on both these scores, and that the present situation, if allowed to continue, will eventually result either in low faculty morale or, over a long period of time, a real shortage of topflight talent in the academic field.

Although I am not able to suggest any remedy for this situation, I do not feel that arbitrarily restricting the temporary recourse offered by higher remuneration from emergency contracts will have any result other than to increase the discontent among those so restricted and further encourage the flight from university positions. I believe, on the contrary, that if sponsored research, emergency or otherwise, can be used to increase faculty salaries through this rather trying period of inflation, and so keep good men at academic posts, then this temporary remedy should be welcomed, at least pending the end of the period or the discovery of some longer-range solution. I do not believe that such an expedient, properly administered, should result in any real disruption of our universities—certainly no more so than is already extant in the nature of the present emergency and the present existence of emergency research.

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Aerosol for Controlling Herbarium Pests

ONE of the serious problems in a herbarium is the protection of specimens from damage by insects. Experience at the U. S. National Arboretum reveals two pests: cockroaches and cigarette beetles. The usual methods of control employ bichloride of mercury, carbon bisulfide, hydrocyanic acid gas, paradichlorbenzene, or naphthalene. An innovation proposed by Hugh O'Neill (*Rhodora,* **40**, 2, [1938]) advocated baking the specimens to eliminate infestation.

Since all these techniques have various shortcomings, experiments were undertaken to find a better solution of the problem. Preliminary tests with ordinary household aerosol bombs indicated satisfactory control, but the containers were too small, as well as too expensive, for a large herbarium. Furthermore, it was thought that the petroleum base of the usual formula might eventually result in discoloration of the herbarium sheets. After consultation with R. A. Fulton and F. F. Smith, of the Bureau of Entomology and Plant Quarantine, USDA, a large, refillable bomb and a special, nonoily formula, with the following ingredients was recommended:

	Grams
Pyrethrum extract	40
Cyclohexanone	60
DDT	100
Freon	1800

Although one application is considered to be effective for a year, the treatment is given semiannually. Four hours are required for 250 herbarium cases, most of the time being consumed in opening and closing the doors. On the basis of cost, not only of materials but also of operators' time, the aerosol is unquestionably cheaper than any of the other methods. In comparison with the bichloride of mercury technique, formerly used at the National Arboretum, the